GIS-Based Cellular Automaton Model to Allocate Irrigated Agriculture Land Use
Aquifer Decline

When amount of water diverted in the zone of influence is greater than recharge, this will result in decline in the water level in the Aquifer.

Most concentrated irrigated farmlands are generally located at the southwest Kansas.
Work Flow

1. Reclassify Cropland Data Layer
2. Extract by Mask of selected 5 crop types
3. Irrigated farmland of 5 selected crop types
4. Reclassify Recorded Saturated Thickness
5. Saturated Thickness < 30
   Saturated Thickness > 30
6. Estimated Recharge
7. Aquifer Withdrawal
8. Python Script Transition Rule
9. Estimated Aquifer Saturated Thickness
10. Irrigated farmland of 5 major crop types
11. Potential Land Use Allocation Based on Aquifer
IF irrigated farmland has saturated thickness > 30 feet, THEN stay irrigated, ELSE change to dry land;

IF irrigated farmland has saturated thickness > 34 feet, THEN corn/sorghum/soybeans/wheat as crop choice ELSE change to dry land;

IF irrigated farmland has saturated thickness > 33 feet, THEN sorghum/soybeans/wheat as crop choice ELSE change to dry land;

IF irrigated farmland has saturated thickness > 32 feet, THEN soybeans/wheat as crop choice ELSE change to dry land;

IF irrigated farmland has saturated thickness > 31 feet, THEN wheat as crop choice ELSE change to dry land;
Further Validation of the model
Using real numbers for the variables
Streamline modeling process

### Comparison of Acreage From the Model Iterations

<table>
<thead>
<tr>
<th></th>
<th>Original Irrigated Cropland 2006</th>
<th>1st Iteration</th>
<th>2nd Iteration</th>
<th>5th Iteration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>992802.9441</td>
<td>897475.1394</td>
<td>855086.906</td>
<td>781495.6633</td>
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<tr>
<td>Sorghum</td>
<td>217909.6162</td>
<td>178710.1869</td>
<td>166345.5314</td>
<td>149316.6205</td>
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<tr>
<td>Soybeans</td>
<td>159489.7965</td>
<td>140859.8967</td>
<td>134848.8268</td>
<td>124154.9032</td>
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<tr>
<td>Wheat (Spring &amp; Winter)</td>
<td>456772.8757</td>
<td>376701.0601</td>
<td>352027.5436</td>
<td>313295.1671</td>
</tr>
</tbody>
</table>

Comparison of Acreage From the Model Iterations
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