Agricultural Irrigation in Wisconsin: Where, What, How much and Why does it matter

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Agricultural Irrigation in Wisconsin: Where We Irrigate

Capacities range from:
86,400 gpd (60 gpm) to
3,600,000 gpd (2500 gpm)

Most are 1,440,000 gpd (1,000 gpm)

3,880 Agricultural Irrigation Wells as of 2012
Agricultural Irrigation in Wisconsin: Well Construction through Time

<table>
<thead>
<tr>
<th>Year</th>
<th>Irrigation Well Approvals</th>
</tr>
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<tbody>
<tr>
<td>2007</td>
<td>91</td>
</tr>
<tr>
<td>2008</td>
<td>152</td>
</tr>
<tr>
<td>2009</td>
<td>111</td>
</tr>
<tr>
<td>2010</td>
<td>75</td>
</tr>
<tr>
<td>2011</td>
<td>101</td>
</tr>
<tr>
<td>2012</td>
<td>203</td>
</tr>
<tr>
<td>2013 (to October 1)</td>
<td>258</td>
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</tbody>
</table>
Agricultural Irrigation in Wisconsin:
Why We Irrigate Where We Irrigate

Surficial Deposits of Sand or Sand and Gravel

Depth to Bedrock > 50 Feet
Overlaying sand and gravel deposits with bedrock > 50’ deep indicates areas where high volume withdrawals are most likely.
90% of all irrigation wells in the state are located in an area with surficial deposits of sand and gravel that are over 50 feet deep.
Agricultural Irrigation in Wisconsin: Trends in Where We Irrigate

Average well age by township

- Oldest wells are located in the middle of the central sands.
- Newest wells are located in:
  - The periphery of the central sands
  - Northwestern WI
  - Eastern WI
  - South central WI
Agricultural Irrigation in Wisconsin: Determining How Much of What We Irrigate

\[ r = \sqrt{\frac{(Well\ Capacity) \times 4.05}{\pi}} \]

Crop extracted by well coverage

USDA Crop Data Layer

Reported withdrawal volume

Inches applied
Agricultural Irrigation in Wisconsin: What We Irrigate

• Potatoes and other produce in the central sands.

• Alfalfa and Soy in the northeast and southeast.

• Corn... everywhere.
Agricultural Irrigation in Wisconsin:
How much we irrigate

<table>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Irrigation (in)</td>
<td>Total Water (in)</td>
<td>Irrigation (in)</td>
<td>Total Water (in)</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>462,726</td>
<td>11.0</td>
<td>18.3</td>
<td>5.9</td>
<td>18.3</td>
<td></td>
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<tr>
<td>Alfalfa-Hay</td>
<td>30,574</td>
<td>9.2</td>
<td>16.5</td>
<td>3.7</td>
<td>16.0</td>
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<tr>
<td>Beans</td>
<td>32,729</td>
<td>9.5</td>
<td>16.7</td>
<td>5.8</td>
<td>18.2</td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td>180,108</td>
<td>11.2</td>
<td>18.4</td>
<td>5.6</td>
<td>18.0</td>
<td></td>
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<tr>
<td>Potatoes</td>
<td>73,691</td>
<td>14.8</td>
<td>22.0</td>
<td>9.3</td>
<td>21.7</td>
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<tr>
<td>Soybeans</td>
<td>36,763</td>
<td>9.0</td>
<td>16.3</td>
<td>5.0</td>
<td>17.4</td>
<td></td>
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<tr>
<td>Sweet Corn</td>
<td>45,224</td>
<td>11.9</td>
<td>19.2</td>
<td>7.4</td>
<td>19.7</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>63,637</td>
<td>9.3</td>
<td>16.5</td>
<td>5.1</td>
<td>17.5</td>
<td></td>
</tr>
</tbody>
</table>
135,174,365,349 groundwater gallons for agricultural irrigation in 2012. This is up 83% from 2011. This is:

- Enough water to cover Dane County in about 5.5” water.
- The rough equivalent of the average annual flow in the Rock River.
- The equivalent of the volume of water in Lake Mendota or 5 Lake Mononas.
- Enough water to fill the lower seating bowl of Camp Randall 120 times.
Agricultural Irrigation in Wisconsin: How Much Land is Irrigated
Agricultural Irrigation in Wisconsin: Hicap Wells and the Two Lakes – Circa 1935

Image Source: Arthur Robinson Map Library
Agricultural Irrigation in Wisconsin: Hicap Wells and the Two Lakes – Circa 1960

Image Source: Arthur Robinson Map Library
Agricultural Irrigation in Wisconsin: Hicap Wells and the Two Lakes – Circa 1975

Image Source: Arthur Robinson Map Library
Agricultural Irrigation in Wisconsin:
Hicap Wells and the Two Lakes – Circa 1985

Image Source: Arthur Robinson Map Library
Agricultural Irrigation in Wisconsin: Hicap Wells and the Two Lakes – Circa 1995

Image Source: Arthur Robinson Map Library
Agricultural Irrigation in Wisconsin: Hicap Wells and the Two Lakes – Circa 2013

Image Source: Arthur Robinson Map Library
Agricultural Irrigation in Wisconsin: Conclusions

• Our irrigated landscapes are highly dynamic and complex social-ecological systems and have been manipulated for over 165 years.

• Causes and responses are not often linear so we should not expect linear solutions to be effective.

• Solving problems on our irrigated landscapes will require us to embrace uncertainty and adopt an experimental mindset towards adaptive co-management.

Image Source: WI Historical Society
Agricultural Irrigation in Wisconsin: Conclusions

- What do we want this landscape to look like in 25, 50 and 100 years?

- What do we need to do to get there?

- What tools do we have and what tools do we need?