Irrigation in Utah

Presented by

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What we hear – Utah is the 2nd driest state in the Nation

Temporal Variation in Precipitation

[Graph showing temporal variation in precipitation in Utah, January-December from 1901-2000. Mean precipitation: 13.56 inches.]

https://www.ncdc.noaa.gov/cag/
Spatial Variation In Precipitation

Precipitation Avg. 1980-2014 (inches)

What we hear - Utah agriculture irrigation diversions are about 80% of total diversions

What happens to all our precipitation? Based on an average precipitation year

| Total Precipitation (average) Utah's area is about 54,300,000 acres | 61,399,000 | 100% |
| Agriculture Irrigation (diversions) Could be some water from another state | 3,583,542 | 5.8% |
| Municipal/Industrial (diversions) Could be some water from another state | 1,045,720 | 1.7% |
| Natural ET, Evaporation, Sublimation, Outflow | 56,769,738 | 92.5% |

Agriculture Irrigation and Municipal Diversion are not all a consumptive Use

Diversion were 900,000 acre-feet less in 2010 Than in 2005 (water supply difference)
Utah’s land use – Why we use water the way we do.

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent of Total</th>
<th>Million of acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated Agriculture</td>
<td>2.2%</td>
<td>1.2</td>
</tr>
<tr>
<td>Urban</td>
<td>1.8%</td>
<td>0.96</td>
</tr>
<tr>
<td>Water (see Great Salt Lake Table)</td>
<td>3.2%</td>
<td>1.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size of Great Salt Lake</th>
<th>Percent of Total</th>
<th>Million of acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>2.0%</td>
<td>1.1</td>
</tr>
<tr>
<td>Minimum (2016)</td>
<td>0.9%</td>
<td>0.5</td>
</tr>
<tr>
<td>Maximum 1988</td>
<td>3.9%</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Wetlands about 1% of Utah’s area
For contrast, over 95% of Illinois land is cropped
Aerial Image with Irrigated Areas Highlighted

Note: boundary line width of irrigated areas is exaggerated to show small irrigated areas.
Aerial Image is 1984 (wet period when Great Salt Lake was at higher elevations)
Utah Water and Water Users
Approximate Annual Water Use, Use Varies each Year based on Supply

- Water Diversions: 4.3-5.4 million acre-feet per year
- Agriculture Irrigation: 80%
- Non-Agriculture: 20%
- Urban (88%)
- Rural (12%)
- 10,357 Irrigated Farms
- Population: 3 million

- A few big irrigation farmers and many small irrigation farmers.
  - 5.2% (540 farms) of irrigated farms account for 49.5% of the irrigated land.
  - 63.8% (6,610 farms) of irrigated farms account for 8.6% of the irrigated lands.

# Summary of USGS Water Use Reports for Utah

<table>
<thead>
<tr>
<th>State Totals</th>
<th>Total Water withdrawal</th>
<th>Non-Agricultural</th>
<th>Crop Irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ac-ft/yr</td>
<td>Population</td>
<td>Ac-ft/yr</td>
</tr>
<tr>
<td>Year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>5,400,632</td>
<td>2,547,389</td>
<td>924,517</td>
</tr>
<tr>
<td>2010</td>
<td>4,629,262</td>
<td>2,763,885</td>
<td>1,045,720</td>
</tr>
<tr>
<td>2015</td>
<td>4,340,609</td>
<td>2,995,919</td>
<td>994,757</td>
</tr>
</tbody>
</table>

** (gpcd is gallons per capita per day) Includes all public supply water (municipal, industry, residential, etc.) and golf courses.
Groundwater and Surface Water Use

- Varies from year-to-year, but about 30 percent groundwater and 70 percent.

- The largest irrigated agriculture area are primarily surface water (Box Elder, Millard, Duchesne, Uintah, Cache, and Utah counties)

Irrigation Method Trends

- Sprinkler irrigation is increasing (especially pivot irrigation). From less than 40 percent 20 years ago to more than 60 percent today, with more than half of the sprinkler irrigation being pivots.

- Drip irrigation on onions is increasing rapidly.
Major Irrigation Groundwater Pumping Areas
What We Hear - Utah’s major crop is alfalfa; should we be growing alfalfa in a desert?

- Alfalfa
  - Supports Utah’s livestock (78% of gross Agriculture Receipts)
  - Utah climate produces great alfalfa
  - Drought tolerant
  - Ideal crop for limited irrigation better than corn
  - Has a good market – A farmers needs to be able to sell or feed what they grow
Agricultures Impact on Utah’s Economy

$21 billion in 2014

Table 2: Economic Contribution of Utah’s Production Agriculture and Agriculture Processing to Utah’s Economy, 2014

<table>
<thead>
<tr>
<th></th>
<th>Direct</th>
<th>Indirect</th>
<th>Induced</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output ($ Millions)</td>
<td>$13,044</td>
<td>$5,931</td>
<td>$2,203</td>
<td>$21,178</td>
</tr>
<tr>
<td>Employment</td>
<td>37,320</td>
<td>26,439</td>
<td>15,815</td>
<td>79,573</td>
</tr>
<tr>
<td>Labor Income ($ Millions)</td>
<td>$1,467</td>
<td>$1,385</td>
<td>$647</td>
<td>$3,459</td>
</tr>
<tr>
<td>Total Value Added ($ Millions)</td>
<td>$3,183</td>
<td>$2,350</td>
<td>$1,189</td>
<td>$6,722</td>
</tr>
</tbody>
</table>

Source: IMPLAN analysis using the revised 2014 agriculture receipts (2015 Agricultural Statistics)

Raising crops and revenue derived from the sale of livestock generated $2.4 billion directly to farmers.

The Economic Contribution of Agriculture to the Utah Economy in 2014, Utah State University Economic Research Institute Report #2016-01, October 2016
What we hear - Grow more fruits and vegetables
Farmers grow what they can sell or feed
Not a big market for fruits and vegetables

• In the U.S. all vegetables, fruits, nuts, potatoes, melons, etc. ≈ 9 million acres
  2.7% of cropped land
• In Utah we have only about 1.5% of irrigated cropped land in fruits and
  vegetables (NASS). Utah’s major produce crops are sour cherries and onions.
  The US Agriculture Statistics don’t include all produce for farmers markets,
  gardens, and community supported agriculture.
• I think we should grow more produce. However, we don’t have many places to
  sell produce, so new markets (or food processor in facilities) need to be
  developed. Remember: Farmers grow what they can sell or feed.
## Average food consumption in US

<table>
<thead>
<tr>
<th>Category</th>
<th>Pounds per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy (milk, yogurt, cheese, ice cream)</td>
<td>630</td>
</tr>
<tr>
<td>Vegetables (mostly corn and potatoes)</td>
<td>415</td>
</tr>
<tr>
<td>Fruit (most weight is water)</td>
<td>273</td>
</tr>
<tr>
<td>Wheat and grains</td>
<td>197</td>
</tr>
<tr>
<td>Meat (chicken, turkey, pork, beef)</td>
<td>185</td>
</tr>
<tr>
<td>Sweeteners (sugar and corn syrup)</td>
<td>141</td>
</tr>
<tr>
<td>Fats (butter and oils)</td>
<td>85</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1,926</strong></td>
</tr>
</tbody>
</table>

## What we need and what we waste

- In the US on average we eat about 30 percent more calories than we need.
- In the US about 40 percent (some reports half) of produce is wasted (at farm, at processing, at store, and at home).

What we hear - Grow more fruits and vegetables
What we hear - Grow more fruits and vegetables
Production Facts and Utah History

• 700 lbs. per year of fruits and vegetables
  • Typical potato yield (60,000 lbs. per acre)
  • Typical apple yield (40,000 lbs. per acre)
  • Typical onion yield (70,000 lbs. per acre)
  • Processing tomato (one harvest 100,000 to 200,000 lbs. per acre)
  • (It takes about 0.1 acres per person to grow our of fruits and vegetables)

• 100 years ago Utah had 33 canneries (Members of Utah Canners Association) in the 1920’s and 1930’s there were about 45 canneries operating

• Vegetable production in Cache Valley
  • Sugar Beets (Cornish, Lewiston, Logan, Utah and Whitney, Idaho)
  • Peas, beans, cabbage, corn, carrots (Del Monte in Smithfield, Utah and Franklin, Idaho)
Utah’s Citizens Views on Agriculture

• Envision Utah survey concerning agriculture (Envision Utah, 2015).
  1. Dramatically increase production of fruits, vegetables, and dairy products in Utah.
  2. Increase Utah’s production of grains and proteins to keep up with Utah’s population growth.
  3. Improve Utah’s food self-sufficiency.
  4. Improve Utahan’s' access to healthy, locally grown food.
  5. Strengthen Utah’s agricultural economy.

• I think Utah’s citizens are great.
• Based on surveys urban water users are willing to give up water for agriculture. Based on my experience with agriculture, if compensated, farmers are will to provide water for urban water users.
What we hear - Water Law - Use it or lose it (doctrine) promotes waste

• Unfortunately the forfeiture and abandonment provisions has led to the misleading adage “Use It or Lose It” applies to water conservation.

• Wasteful water diversions and practices are not permissible under the state’s water law.

• Water conservation is not forfeiture or abandonment, but is part of reasonable and beneficial use.

• In over 30 years working and an expert witness in water rights in the west, I have not seen a water right due lost due to conservation. However, I have seen actions taken by states for wasting of water.
What we hear - Reform the bureaucratic process of water trading

• While bureaucracy (prior appropriation water law) can be burdensome, it protects water users, but it does allow allocation of water from one use to another.

• Improvements could include provisions to make temporary water right transfers easier such as forms of water banks, and updated temporary transfer procedures.

• Many metropolitan regions in the Arid Western United States have obtained a portion of their water from agriculture.

• In my experience, water has moved to the highest value (or highest ability to pay). Examples include: transfer of water from agriculture to municipal to help provide water to 10’s million of people in Southern California, Phoenix, Colorado’s Front Range, and the Wasatch Front.
What we hear - Pay for water deliverance through user fees to promote conservation; not property taxes or federal subsidies

• This is a complicate topic. A question would be; what would things be like without the public funded water projects?
• Users do pay fees and many property owners use water or benefit from the water development.

USBR as an example:
• The USBR is the one of many federal water entity and has annual budget is about one billion dollars (about $3 for each person in the United States), a large portion going to Indian Water Right Settlements and grants.
• Currently USBR provides water to more than 31 million people and irrigation water for 10 million acres of farmland, which produce 60% of the nation's vegetables and 25% of its fruits and nuts.
• USBR is also the second largest producer of hydroelectric power in the western United States.
What we hear - Use more effective tiered pricing systems to promote conservation.

• This helps promote water conservation.
• It is common among municipal water supplies and among some irrigation water suppliers.
What we hear - Explore less costly alternatives before building large, expensive projects: water is often managed according to political considerations, rather than economic ones.

• I agree. However, water projects are more than a political consideration.

• I think economics are considered.
What we hear – Utah has one of the highest per capita water use in the US

• It is true, but it’s a decision that residents have made. Many in Utah like lawns, trees, shrubs, flowers, and gardens in their landscapes.

• In some counties non-agriculture water is only 1 or 2 percent of total.

• Utah’s indoor water use is similar to that of most of the other states.

• USU Extension and others are involved in programs and research projects to reduce outdoor water use, while keeping colorful living landscapes.

• There is a 2010 DWR report titled, “Why do we use so much water when we live in a desert?” My initial response is that we use so much water because we live in a desert.

• We still have opportunity reduce outdoor water use just as Las Vegas and Phoenix reduced their water use. Our residential lots have up to 3 times the irrigated area as Phoenix lots.
Questions