Quantifying and Visualizing Agricultural Land Use Rate of Change along the Wasatch Front, Utah

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Outline for Today

• Brief historical **Context**.
• Purpose and Objectives for this **Project**.
• **Methods** to completing this project.
• A selection of **Results**.
WHY AGRICULTURE MATTERS TO UTAHNS

Survey participants were asked to allocate 100 points across these outcomes based on which they considered most important.

- **23%** Improving Utah's food self-sufficiency
- **20%** Ensuring Utahns can eat locally grown food
- **19%** Maintaining the open space provided by farms and ranches
- **17%** Improving rural Utah's economy
- **12%** Maintaining Utah's agricultural heritage
- **8%** Allowing agricultural land and water to convert through market forces to higher-paying uses like houses and businesses

Data derived from the USDA National Agricultural Statistics Service.
## Threats to Agricultural Land

### Fastest Growing Counties in Utah

<table>
<thead>
<tr>
<th>Rank</th>
<th>County</th>
<th>Change</th>
<th>Rank</th>
<th>County</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wasatch County</td>
<td>4.6%</td>
<td>1</td>
<td>Wasatch County</td>
<td>21.6%</td>
</tr>
<tr>
<td>2</td>
<td>Utah County</td>
<td>3.2%</td>
<td>2</td>
<td>Morgan County</td>
<td>17.0%</td>
</tr>
<tr>
<td>3</td>
<td>Morgan County</td>
<td>2.8%</td>
<td>3</td>
<td>Uintah County</td>
<td>14.8%</td>
</tr>
<tr>
<td>4</td>
<td>Washington County</td>
<td>2.7%</td>
<td>4</td>
<td>Utah County</td>
<td>13.3%</td>
</tr>
<tr>
<td>5</td>
<td>Iron County</td>
<td>2.5%</td>
<td>5</td>
<td>Washington County</td>
<td>11.9%</td>
</tr>
<tr>
<td>6</td>
<td>Cache County</td>
<td>2.5%</td>
<td>6</td>
<td>Duchesne County</td>
<td>11.9%</td>
</tr>
<tr>
<td>7</td>
<td>Piute County</td>
<td>2.4%</td>
<td>7</td>
<td>Davis County</td>
<td>9.7%</td>
</tr>
<tr>
<td>8</td>
<td>Juab County</td>
<td>2.3%</td>
<td>8</td>
<td>Tooele County</td>
<td>8.7%</td>
</tr>
<tr>
<td>9</td>
<td>Davis County</td>
<td>1.9%</td>
<td>9</td>
<td>Summit County</td>
<td>8.1%</td>
</tr>
<tr>
<td>10</td>
<td>Tooele County</td>
<td>1.7%</td>
<td>10</td>
<td>Cache County</td>
<td>8.1%</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau; DemographyUTAH Population Committee

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### Utah Population Growth Rates by County:

- **Wasatch**: 21.6%
- **Duchesne**: 11.9%
- **Utah**: 13.3%

Source: DemographyUTAH Population Committee
Why the Wasatch Front?

Represents:
• 95% of fruit production in Utah.
• 92% of vegetable production in Utah.
• 94% of high value irrigated land in Utah.
Purpose for Project

• **Quantify** and **Visualize** land **capability** for agricultural systems:
  • Orchards
  • Vegetables
  • Forages
• **Calculate** rate of change for each system.
• **Create** and **store** dataset for future ecosystem service study.
Objectives for Project

1) Determine specific biophysical variables that best describe where cropping systems are located along the Wasatch Front.

2) Calculate rate of change of specific cropping systems.

3) **Develop models within ArcGIS Pro to automate geoprocessing workflow.**

4) Use ESRI Story Maps and **Google Earth** to visualize the extent of these cropping systems and land use change along the Wasatch Front and Cache Valley.
### Data Collection

All data is publicly available.

<table>
<thead>
<tr>
<th>AgName</th>
<th>Cropping System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ORCHARD</strong></td>
<td>Orchard, Vineyard, Orchard unspecified, Peaches, Grapes, Apricots, Cherries, Apples</td>
</tr>
<tr>
<td></td>
<td>Alfalfa, Dry Alfalfa, Dry Grain, Dry Grain/Seeds, Dry Oats, Grain, Grass Hay, Grass Hay - Sub-Irrigated, Idle-Irrigated Pasture, Oats, Pasture, Pasture Sub-Irrigated, Sorghum, Idle Pasture,</td>
</tr>
<tr>
<td><strong>FORAGE</strong></td>
<td>Beans, Berries, Corn, Dry Safflower, Melon/Pumpkin, Squash, Onions, Other Horticulture, Other Vegetables, Potatoes, Safflower, Tomatoes, Vegetables, Melon, Pumpkins, Horticulture, Watermelons, Potato, Speltz, Onion, Mustard, Sugarbeets, Soybeans,</td>
</tr>
<tr>
<td><strong>VEGFRUIT</strong></td>
<td>Barley, Spring Wheat, Winter Wheat, Grain Seeds/unspecified, Triticale, Rye, Canola, Durum Wheat, Flaxseed, Sunflower</td>
</tr>
<tr>
<td><strong>GRAIN</strong></td>
<td>Open Water, Riparian, Sewage Lagoon, Water, Wet Flats</td>
</tr>
<tr>
<td><strong>SURFWATER</strong></td>
<td>Urban, Urban Grass, Urban Grass/Parks, Urban/Urban Idle</td>
</tr>
<tr>
<td><strong>DEVELOPED</strong></td>
<td>Dry Land, Fallow Irrigated Ag, Fallow Irrigated Land, Idle-Irrigated Ag, Idle-Irrigated Land, Turf Farms, Dry Land/Other, Idle, Turfgrass, Fallow</td>
</tr>
</tbody>
</table>

Source: Utah AGRC
ESRI’s ArcGIS Pro allows for easier ways to share data and workflows with non-GIS users by sharing Projects.
Developed Models
Run the model in sequence.

For any Study Area.
Using each Model
The user can input their own parameters into each model!
Methods
Methods
Results
Results
Conclusion

• Developing models allows for a more streamlined workflow.

• Visualizing in Google Earth allows for anyone to access to data.

• More work needed to finalize objectives.
  • Develop and visualize selected areas for cropping systems.
  • Compare rate of change of specific cropping systems to NASS data.
Thank you!

TIME FOR QUESTIONS