

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

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2019 USU SRS

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Outline

Context

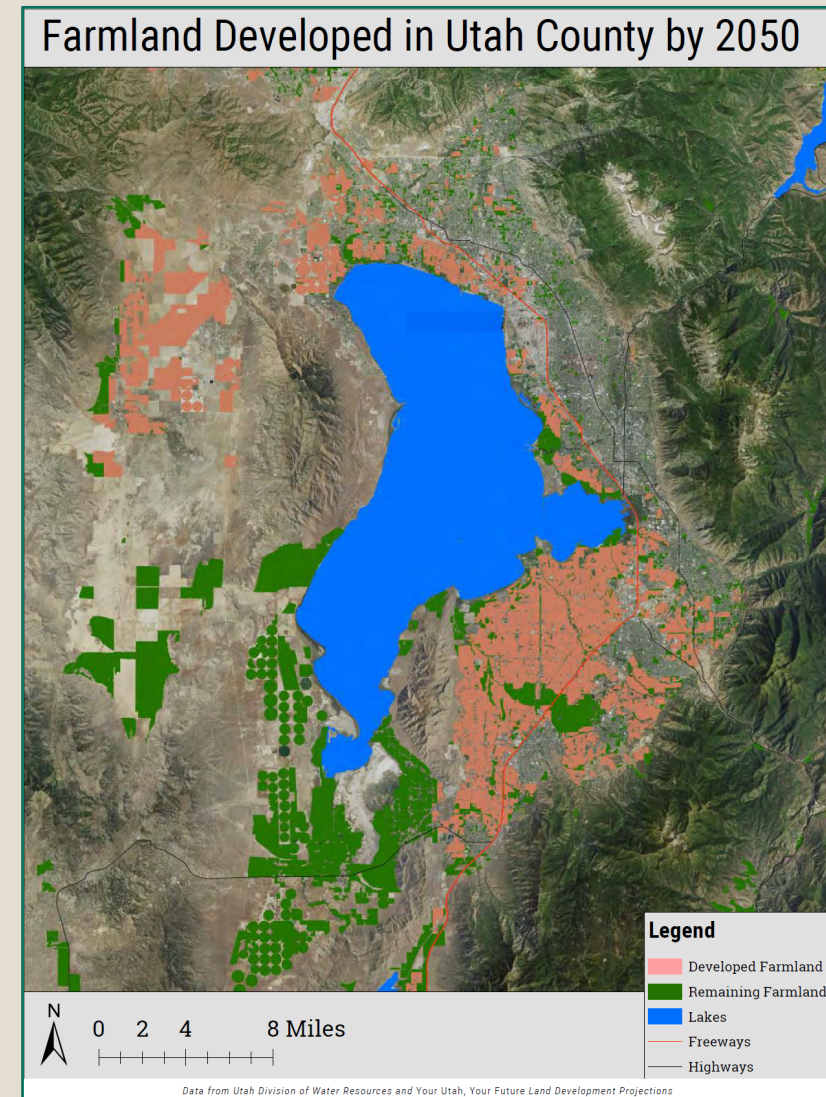
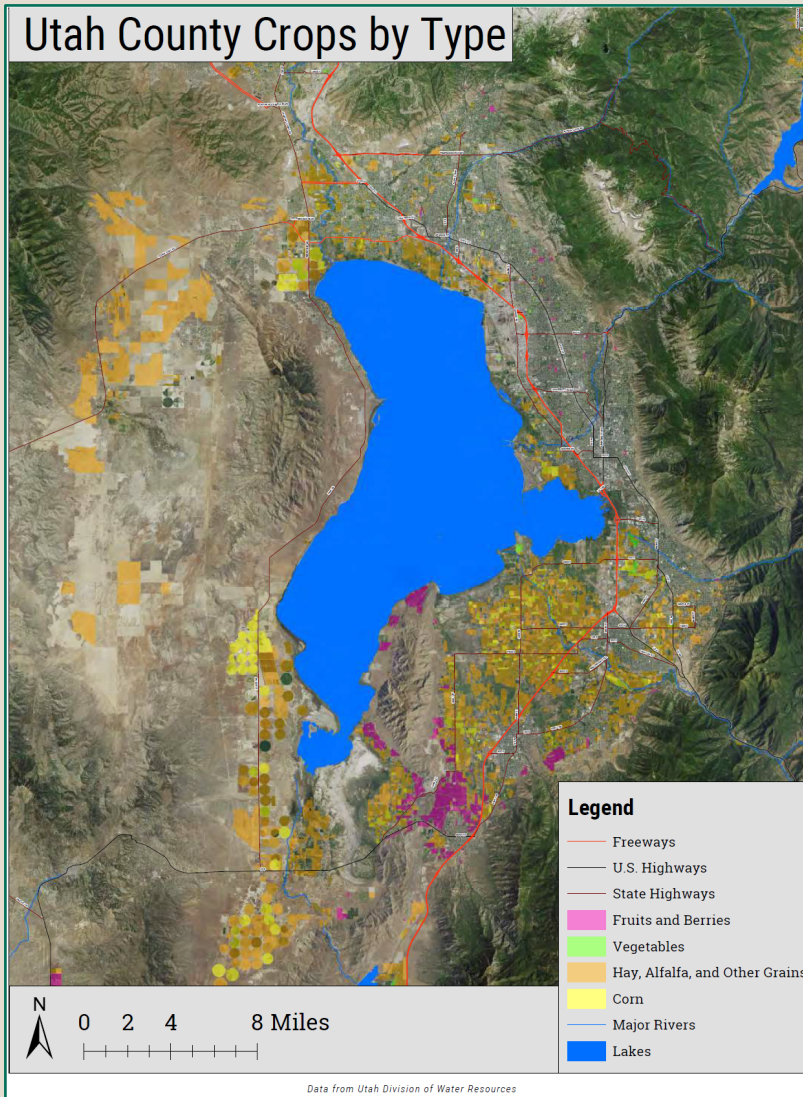
Project

Methods

Results

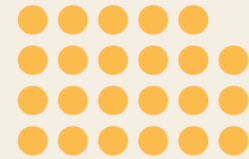
Outline for Today

- 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



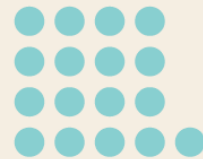
20%

Ensuring Utahns can eat locally grown food



19%

Maintaining the open space provided by farms and ranches



17%

Improving rural Utah's economy



12%

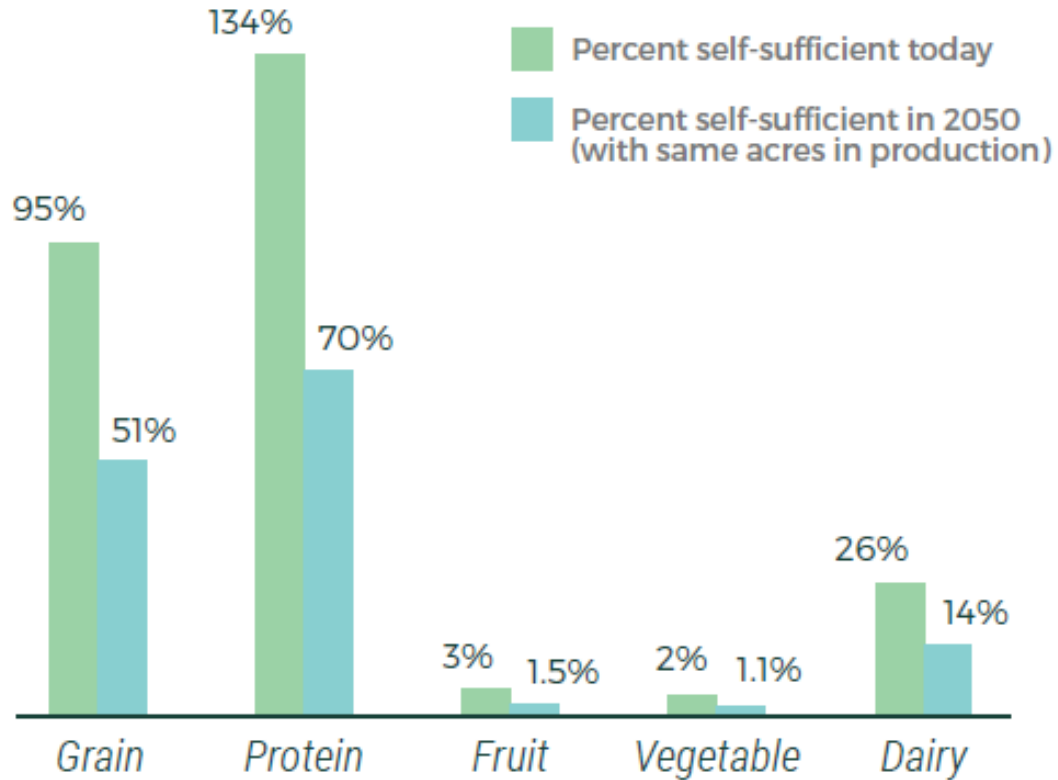
Maintaining Utah's agricultural heritage



8%

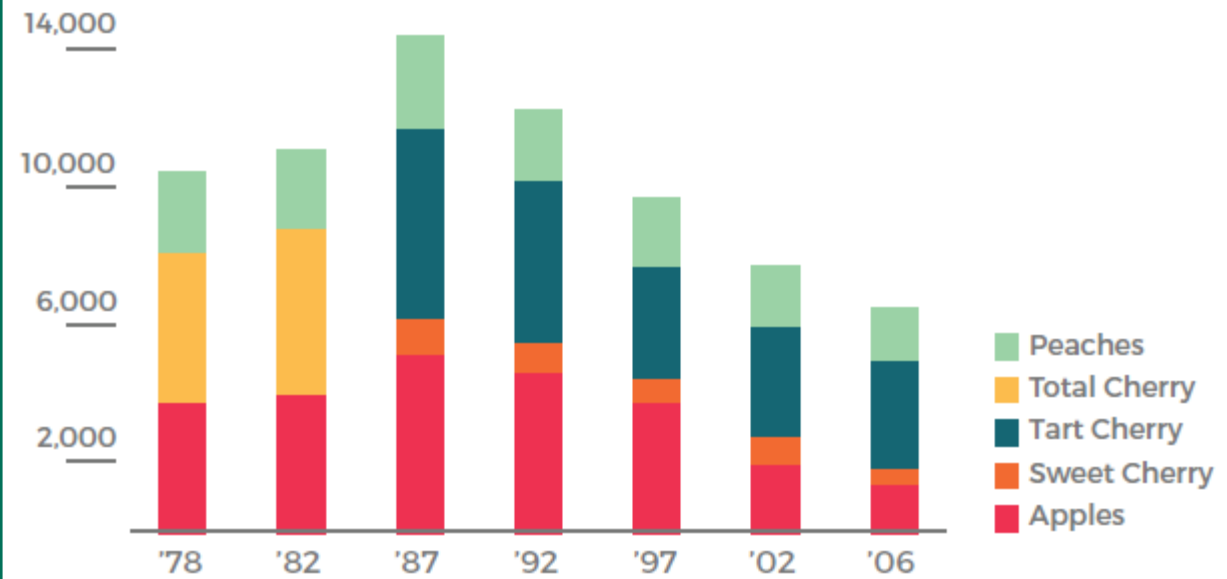
Allowing agricultural land and water to convert through market forces to higher-paying uses like houses and businesses

AGRICULTURAL SELF-SUFFICIENCY



AGRICULTURAL PRODUCTION IN UTAH

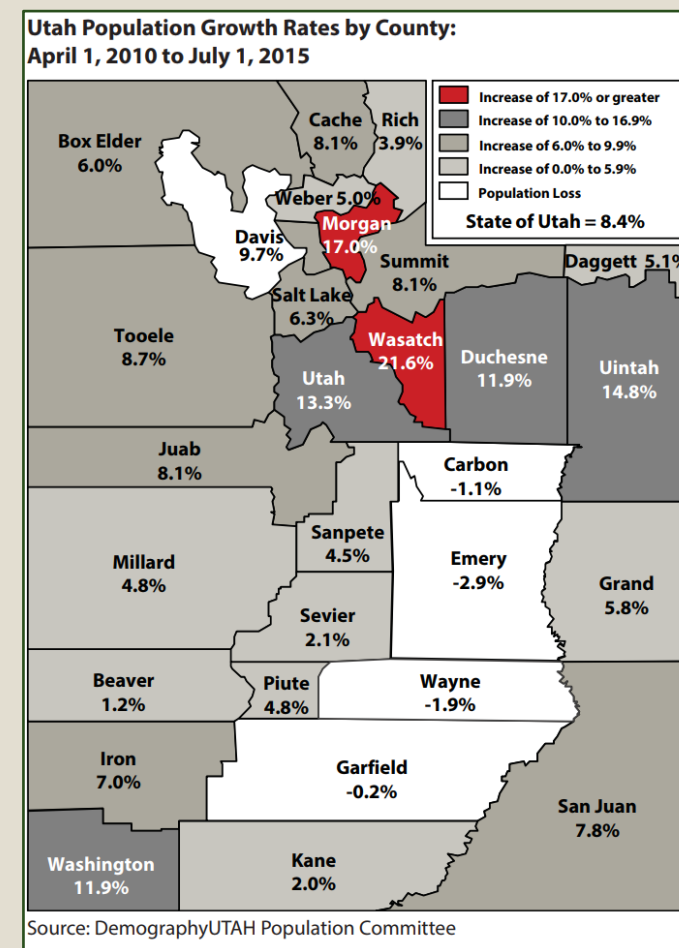
(ACRES IN PRODUCTION)



Threats to Agricultural Land

2014-2015			2010 Census-2015		
Rank	County	Change	Rank	County	Change
1	Wasatch County	4.6%	1	Wasatch County	21.6%
2	Utah County	3.2%	2	Morgan County	17.0%
3	Morgan County	2.8%	3	Uintah County	14.8%
4	Washington County	2.7%	4	Utah County	13.3%
5	Iron County	2.5%	5	Washington County	11.9%
6	Cache County	2.5%	6	Duchesne County	11.9%
7	Piute County	2.4%	7	Davis County	9.7%
8	Juab County	2.3%	8	Tooele County	8.7%
9	Davis County	1.9%	9	Summit County	8.1%
10	Tooele County	1.7%	10	Cache County	8.1%

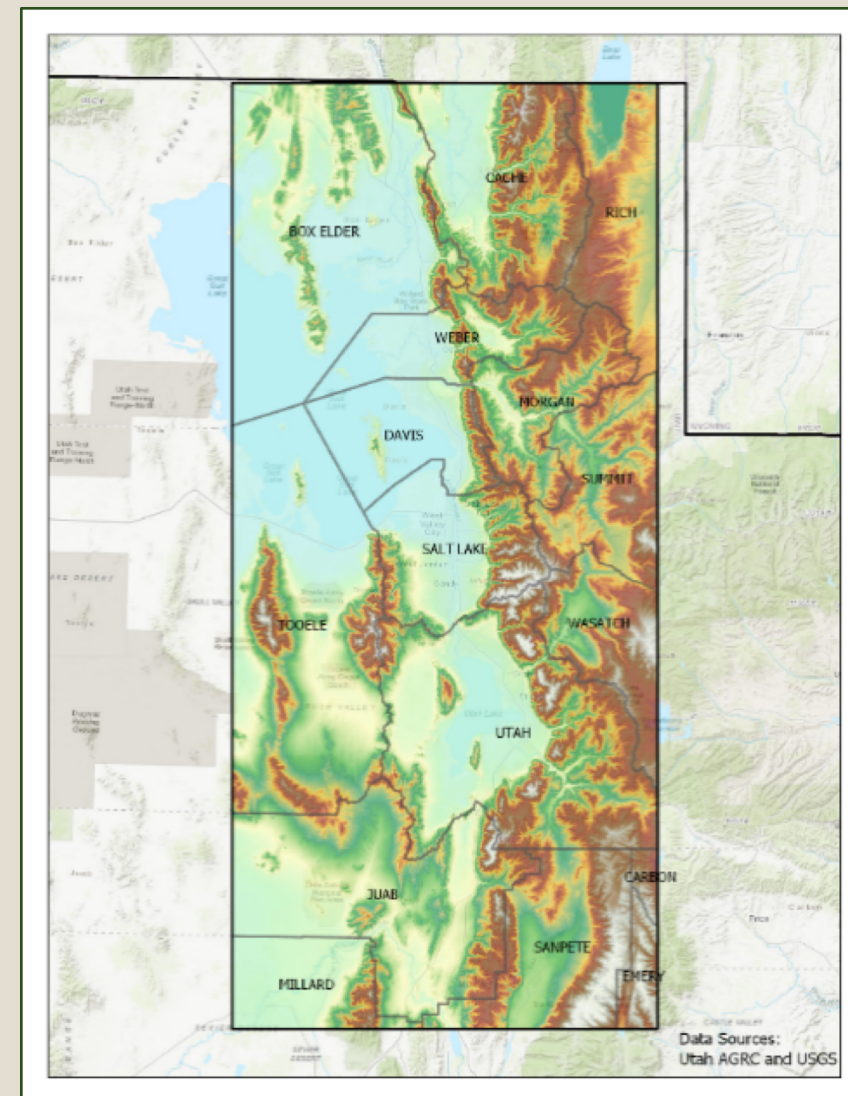
Source: U.S. Census Bureau; DemographyUTAH Population Committee



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

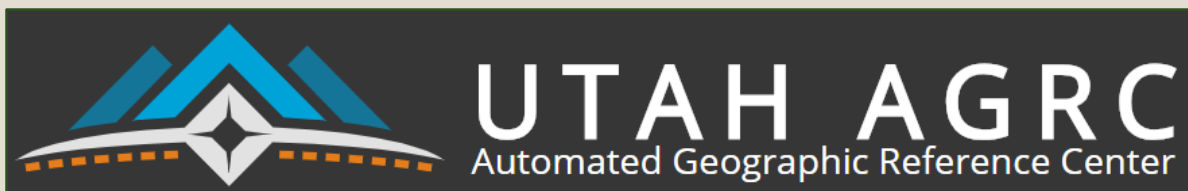
- **Quantify** and **Visualize** land capability for agricultural systems:
 - Orchards
 - Vegetables
 - Forages
- **Calculate** rate of change for each system.
- **Create** and **store** dataset for future ecosystem service study.

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.

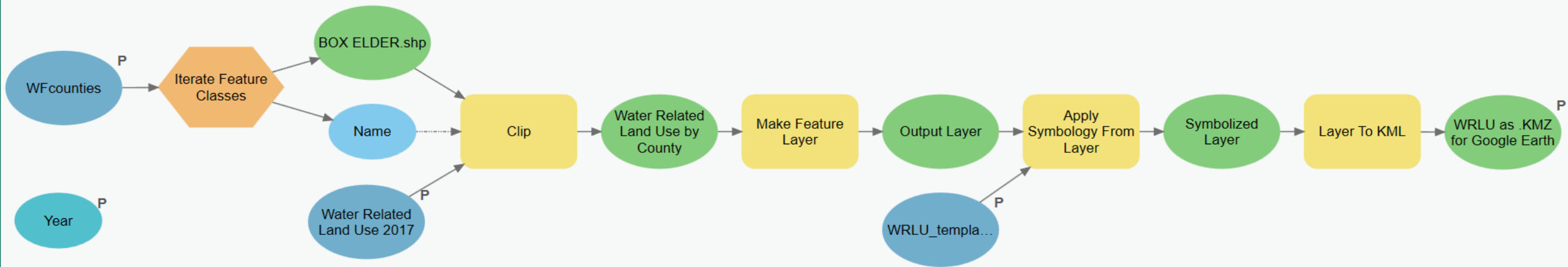


AgName	Cropping System
ORCHARD	Orchard, Vineyard, Orchard unspecified, Peaches, Grapes, Apricots, Cherries, Apples
FORAGE	Alfalfa, Dry Alfalfa, Dry Grain, Dry Grain/Seeds, Dry Oats, Grain, Grass Hay, Grass Hay - Sub-Irrigated, Idle-Irrigated Pasture, Oats, Pasture, Pasture Sub-Irrigated, Sorghum, Idle Pasture, 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,
VEGFRUIT	Barley, Spring Wheat, Winter Wheat, Grain Seeds/unspecified, Triticale, Rye, Canola, Durum Wheat, Flaxseed, Sunflower
GRAIN	Open Water, Riparian, Sewage Lagoon, Water, Wet Flats
SURFWATER	Urban, Urban Grass, Urban Grass/Parks, Urban/Urban Idle
DEVELOPED	Dry Land, Fallow Irrigated Ag, Fallow Irrigated Land, Idle-Irrigated Ag, Idle-Irrigated Land, Turf Farms, Dry Land/Other, Idle, Turfgrass, Fallow
OTHER	

Automating Workflow



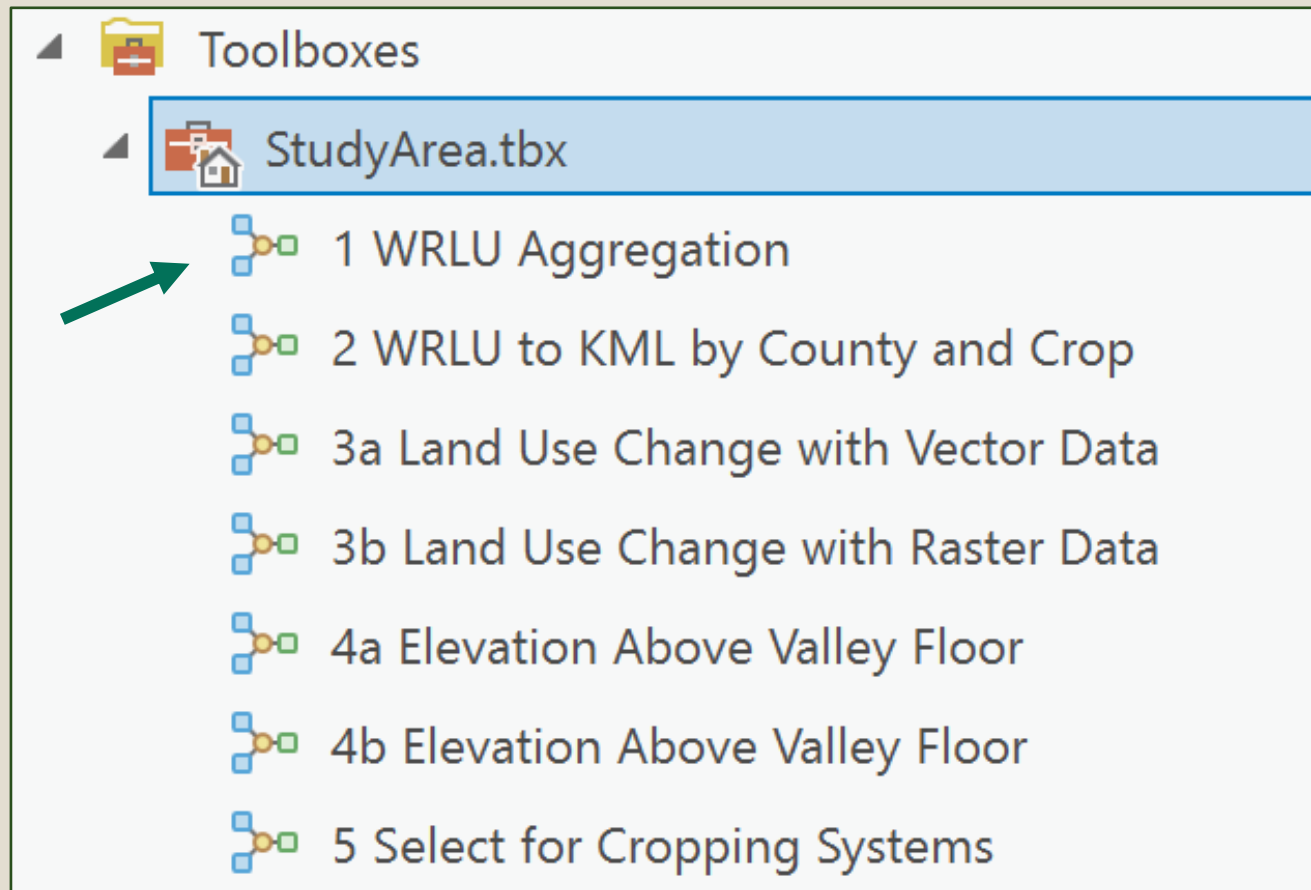
ESRI's ArcGIS Pro allows for easier ways to share data and workflows with non-GIS users by sharing Projects.



Developed Models

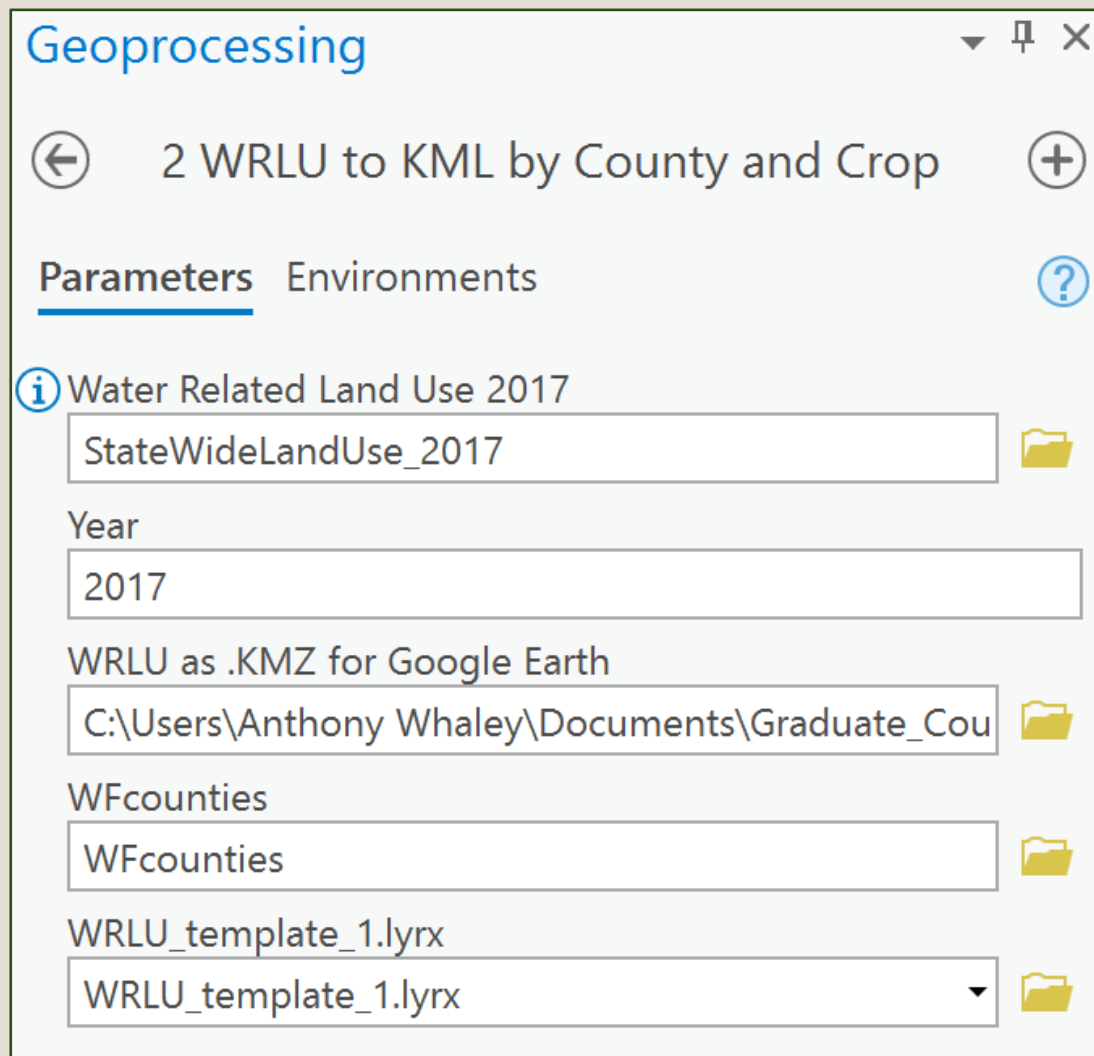
Run the model in sequence.

For any Study Area.



Using each Model

The user can input their own parameters into each model!



Geoprocessing

2 WRLU to KML by County and Crop

Parameters Environments

Water Related Land Use 2017

StateWideLandUse_2017

Year

2017

WRLU as .KMZ for Google Earth

C:\Users\Anthony Whaley\Documents\Graduate_Cou

WFcounties

WFcounties

WRLU_template_1.lyrx

WRLU_template_1.lyrx

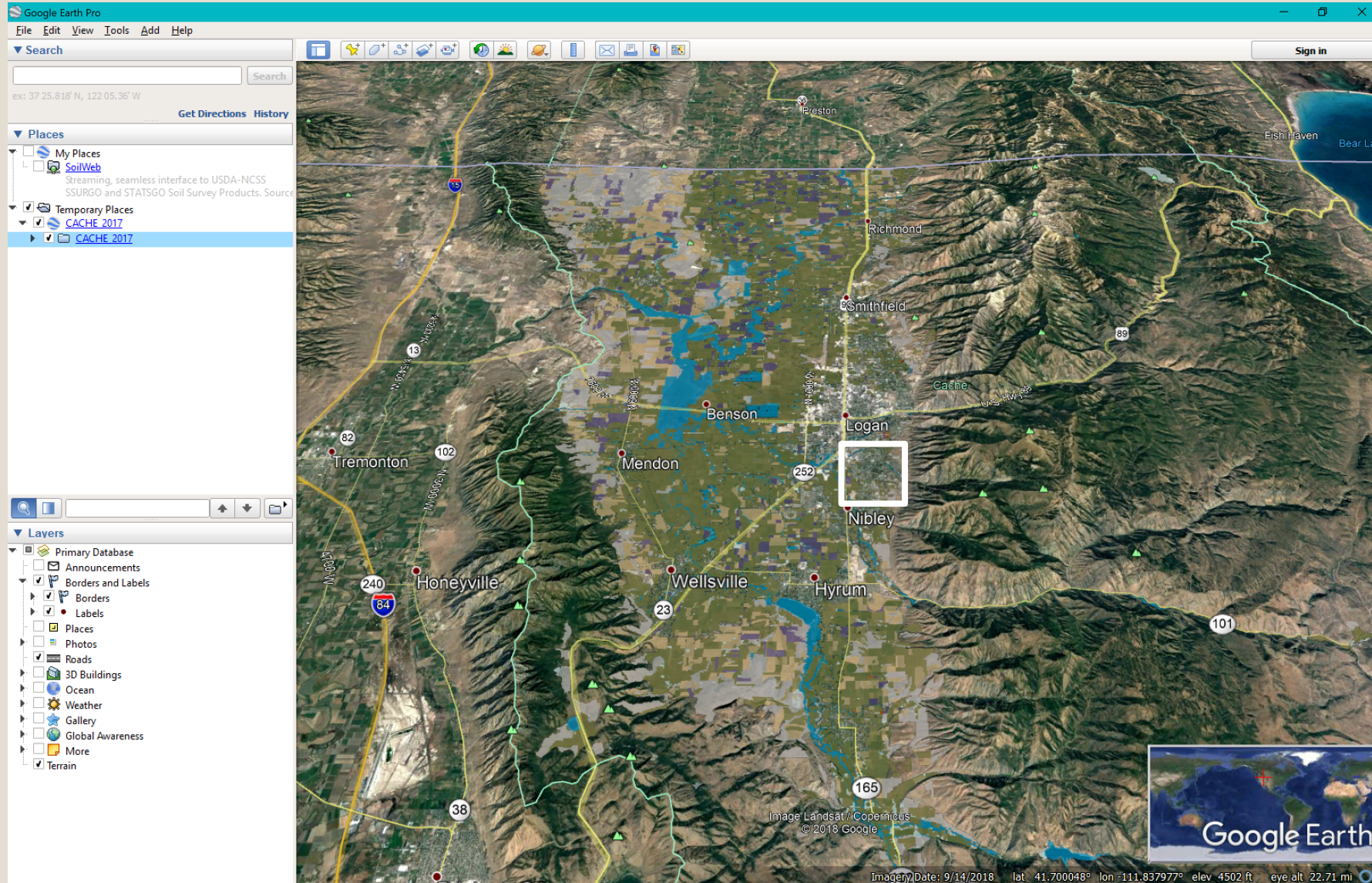
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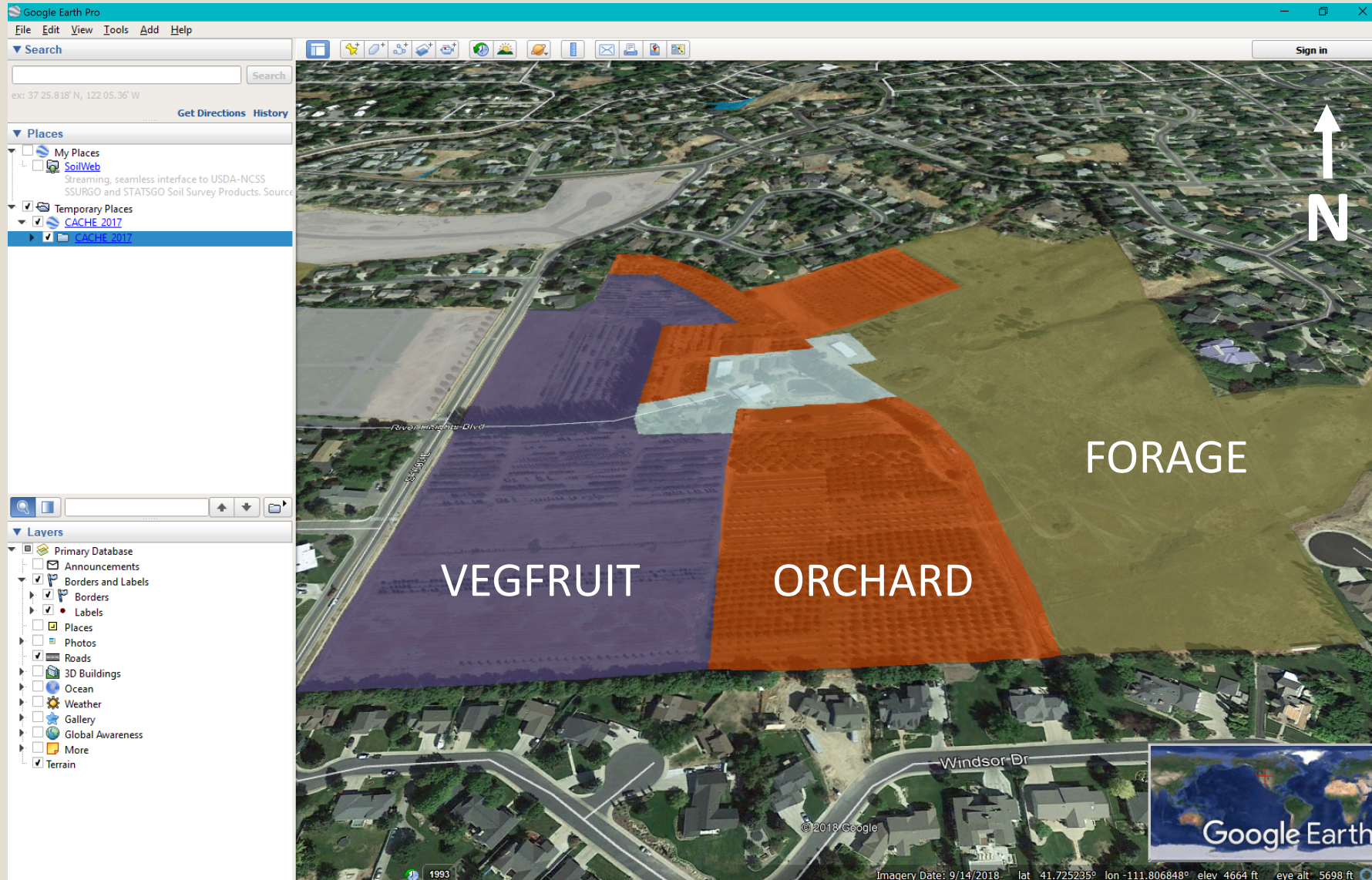
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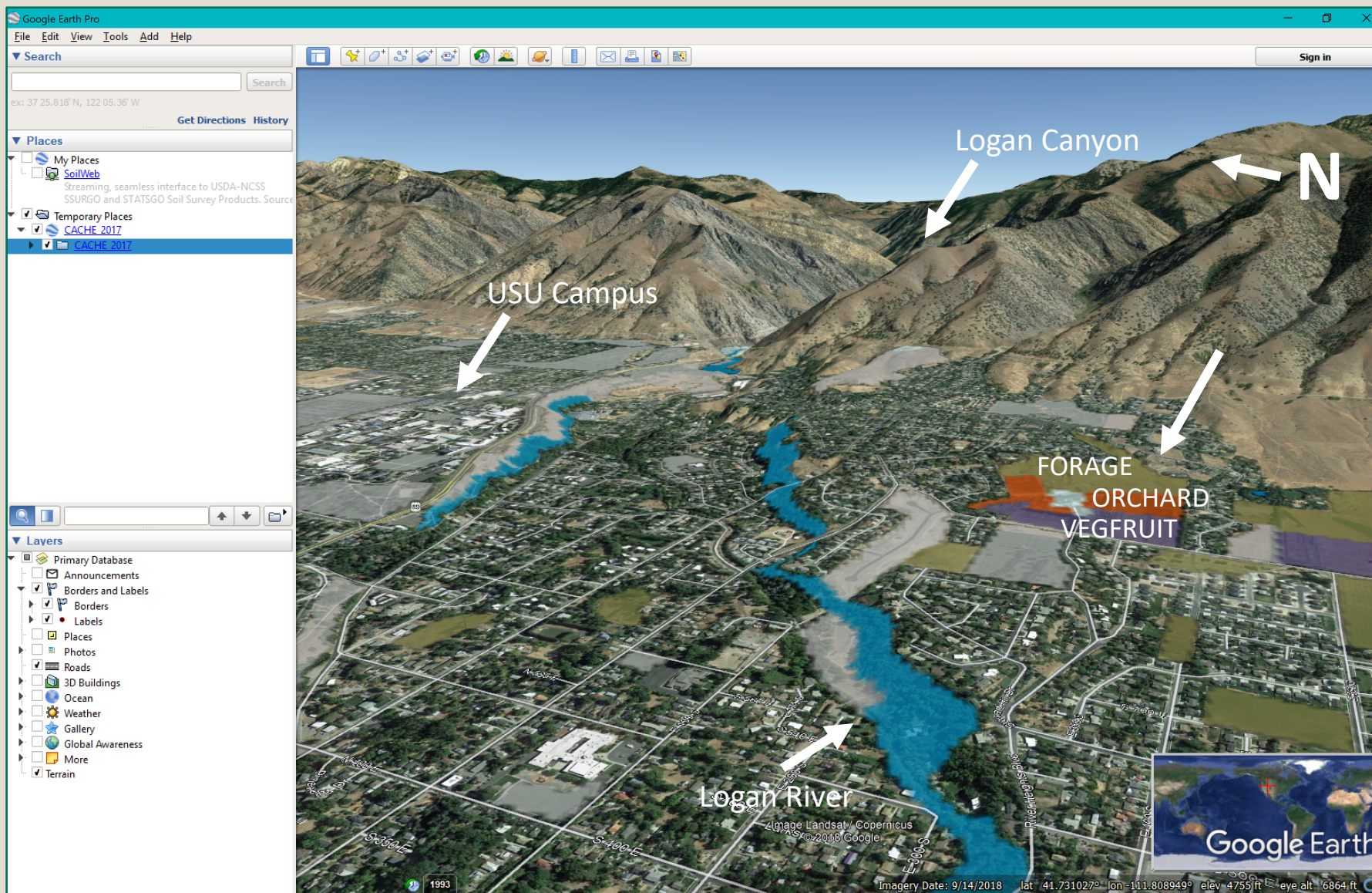
Results



The screenshot shows the Google Earth Pro interface. On the left, the 'Places' panel shows 'CACHE 2017' selected. The 'Layers' panel is expanded to show 'Terrain' checked. The main map area displays a 3D view of a landscape with a river and agricultural fields. A data popup window is open over a specific area, displaying the following information:

Developed/Open Space	
FID	11986
LUID	218652
Landuse	Riparian/Wetland
CropGroup	None
Descriptio	Riparian
IRR_Method	None
Acres	13.97482
State	Utah
County	CACHE
Basin	Bear River
SubArea	Cache Valley
Label_Clas	RIP Other
LABEL	RIP
Class_Name	Developed/Open Space
OldLanduse	RIP
LU_Group	RIP
Shape_Leng	3389.853539
AgName	SURFWATER

Below the popup, the map features two large colored areas labeled 'FORAGE' (orange) and 'VEGFRUIT ORCHARD' (purple). A north arrow is visible on the right side of the map. The bottom status bar shows the imagery date as 9/14/2018 and coordinates: lat 41.739230°, lon -111.807186°, elev 4618 ft, eye alt 5823 ft.



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