

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

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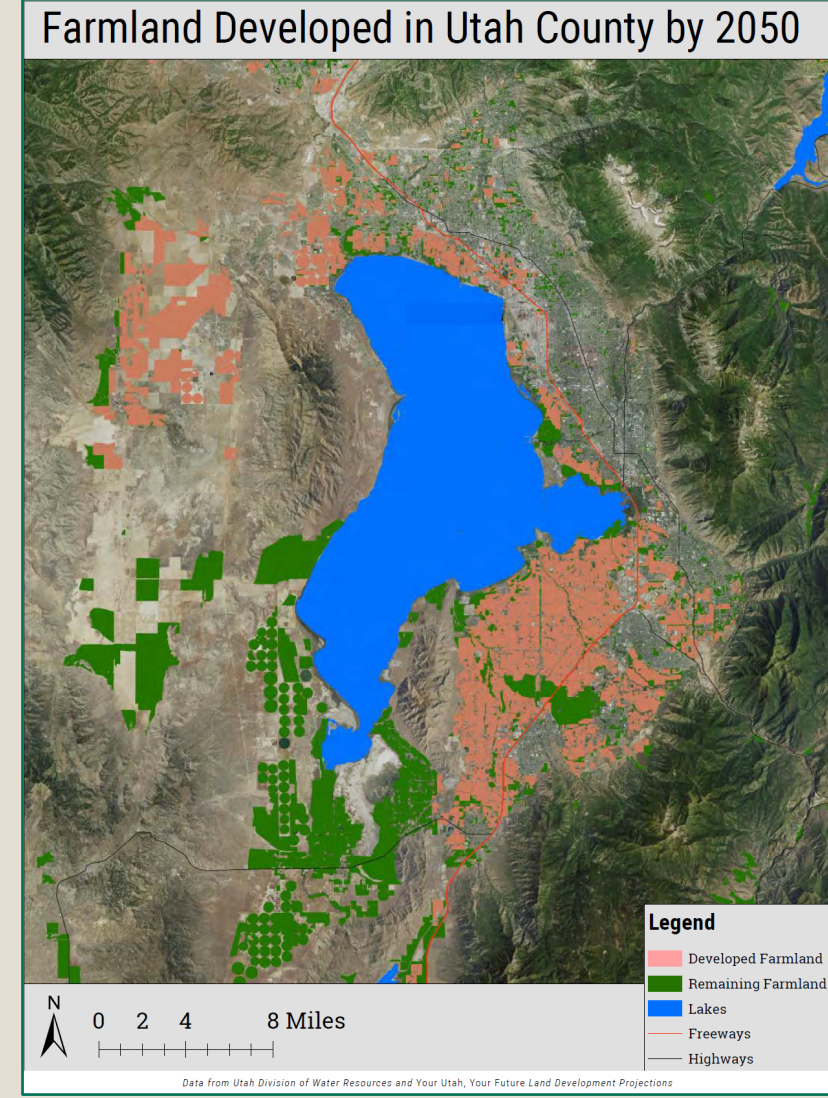
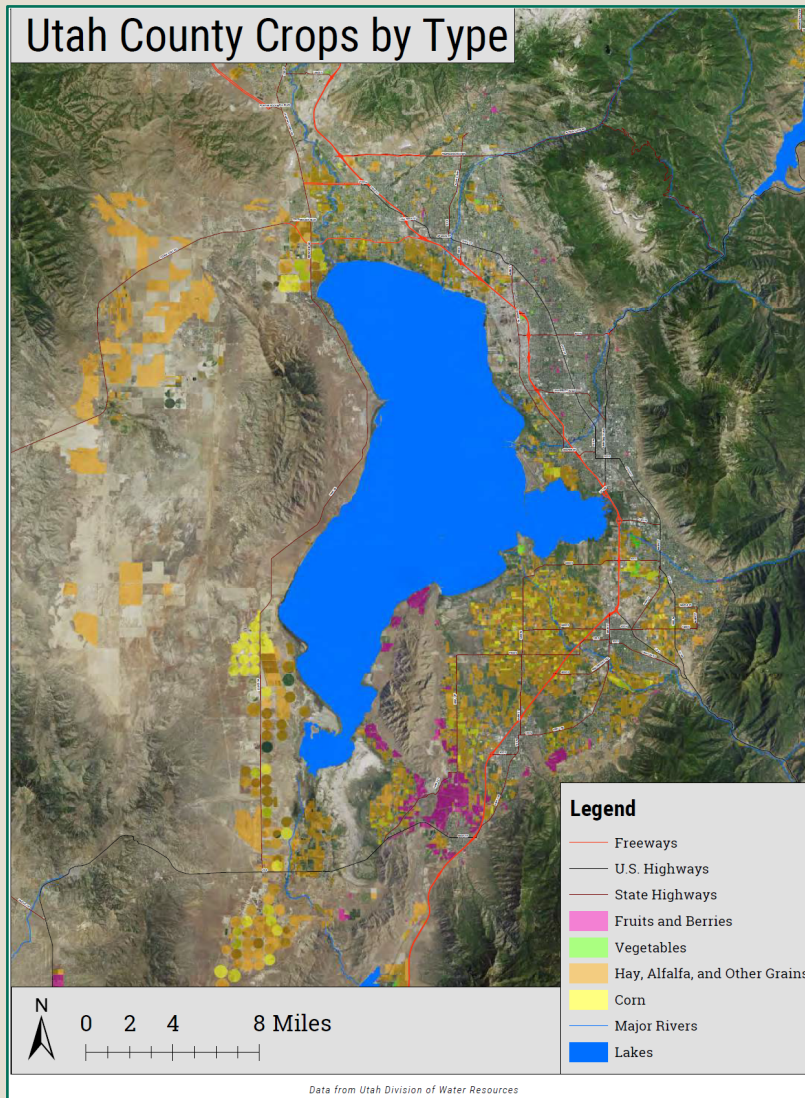
ANTHONY WHALEY

2019 USU SRS

10 APRIL 2019

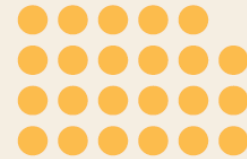
# Outline for Today

- 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*



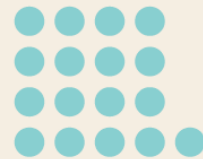
20%

*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*

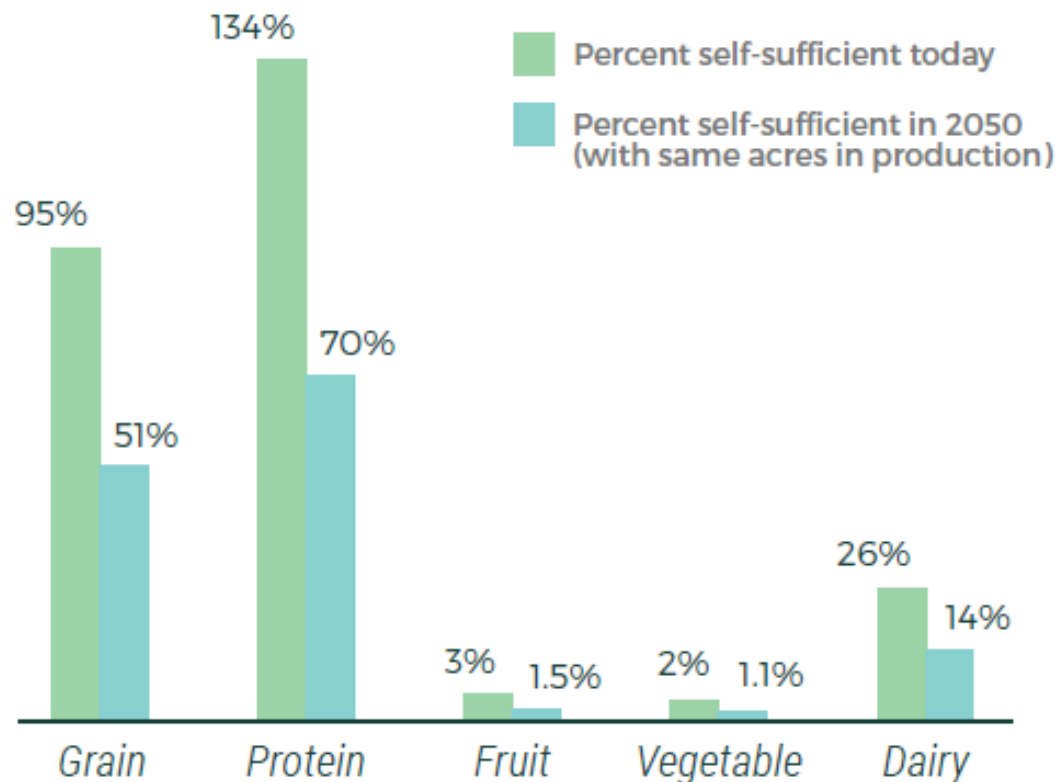


8%

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

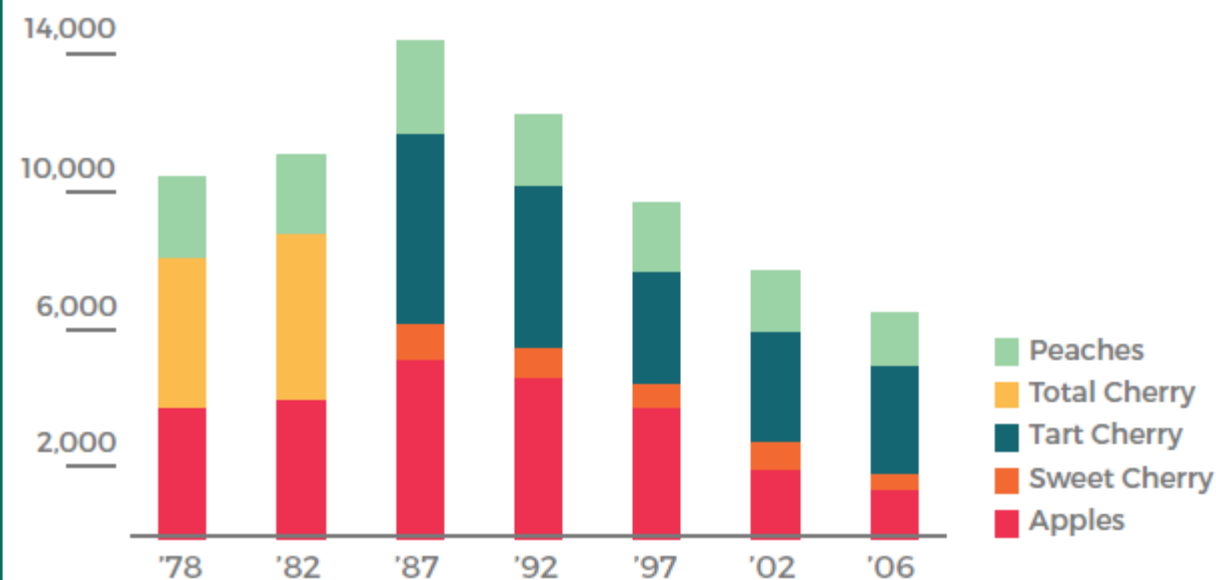


## AGRICULTURAL SELF-SUFFICIENCY



## AGRICULTURAL PRODUCTION IN UTAH

(ACRES IN PRODUCTION)



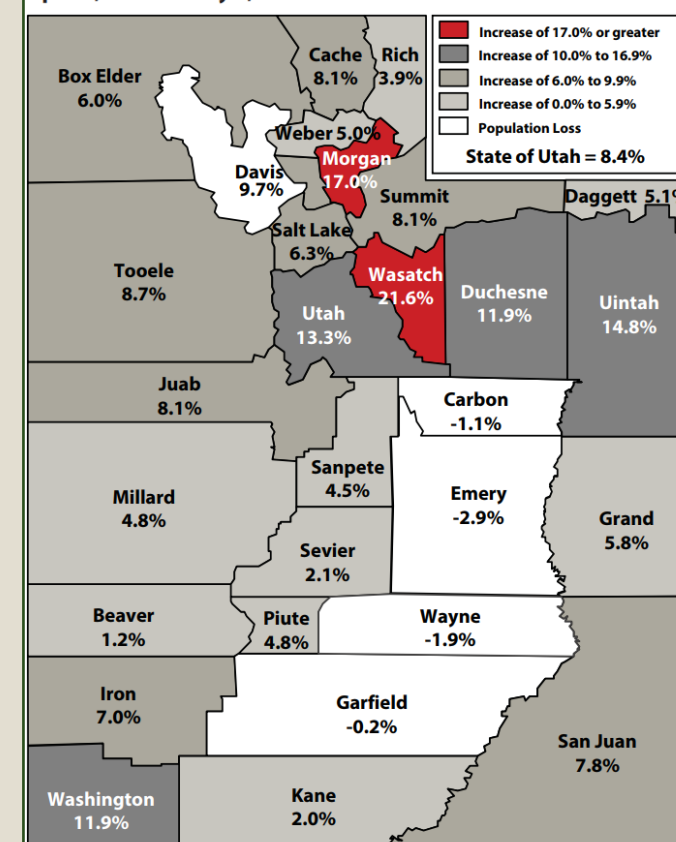
# Threats to Agricultural Land

## Fastest Growing Counties in Utah

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

Utah Population Growth Rates by County:  
April 1, 2010 to July 1, 2015

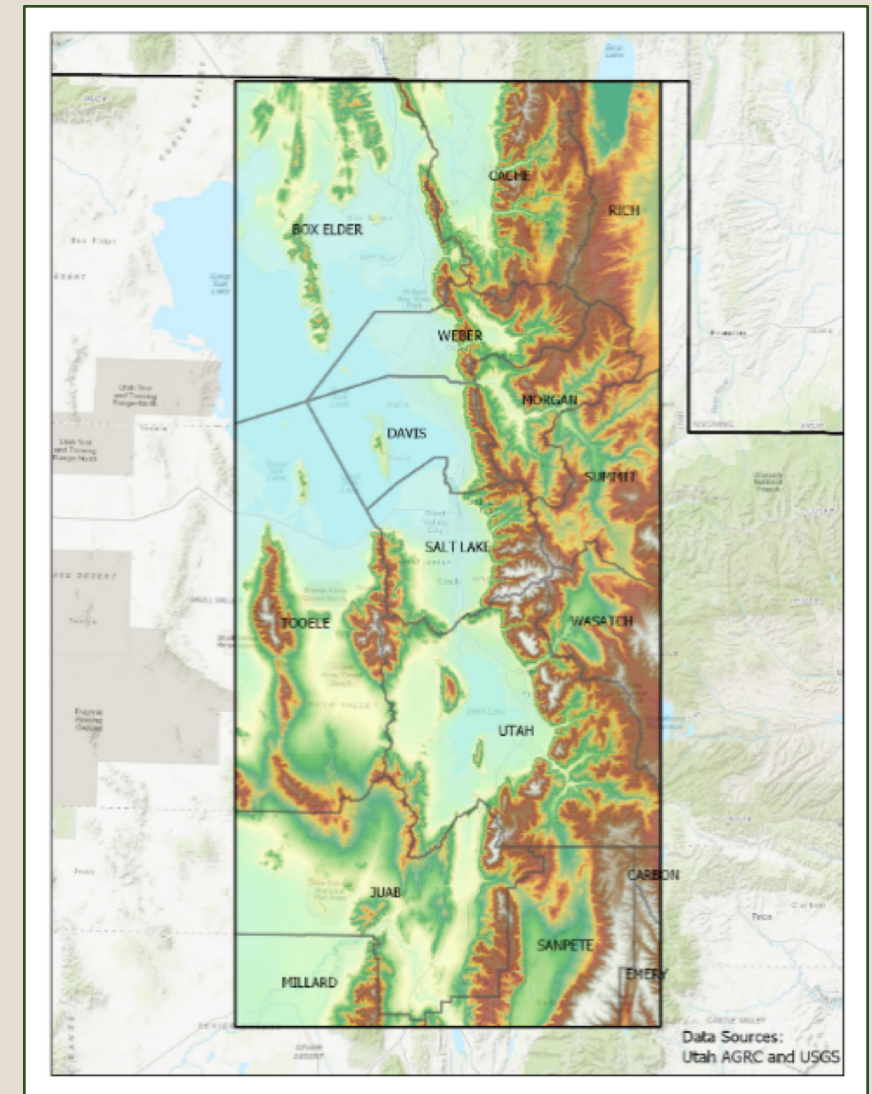


Source: DemographyUTAH Population Committee

# 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.

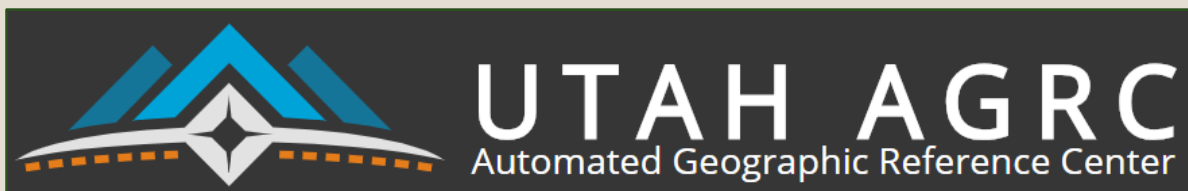


# Objectives for Project

- 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.

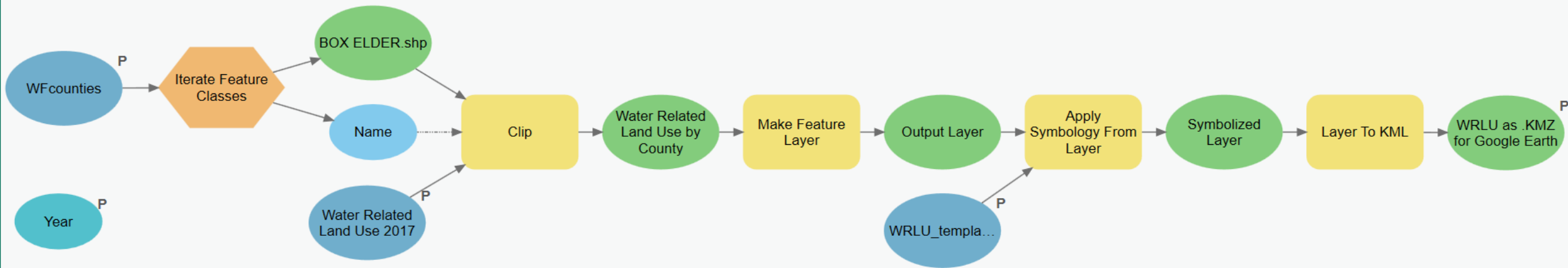


AgName	Cropping System
<b>ORCHARD</b>	Orchard, Vineyard, Orchard unspecified, Peaches, Grapes, Apricots, Cherries, Apples
<b>FORAGE</b>	Alfalfa, Dry Alfalfa, Dry Grain, Dry Grain/Seeds, Dry Oats, Grain, Grass Hay, Grass Hay - Sub-Irrigated, Idle-Irrigated Pasture, Oats, Pasture, Pasture Sub-Irrigated,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

# Automating Workflow



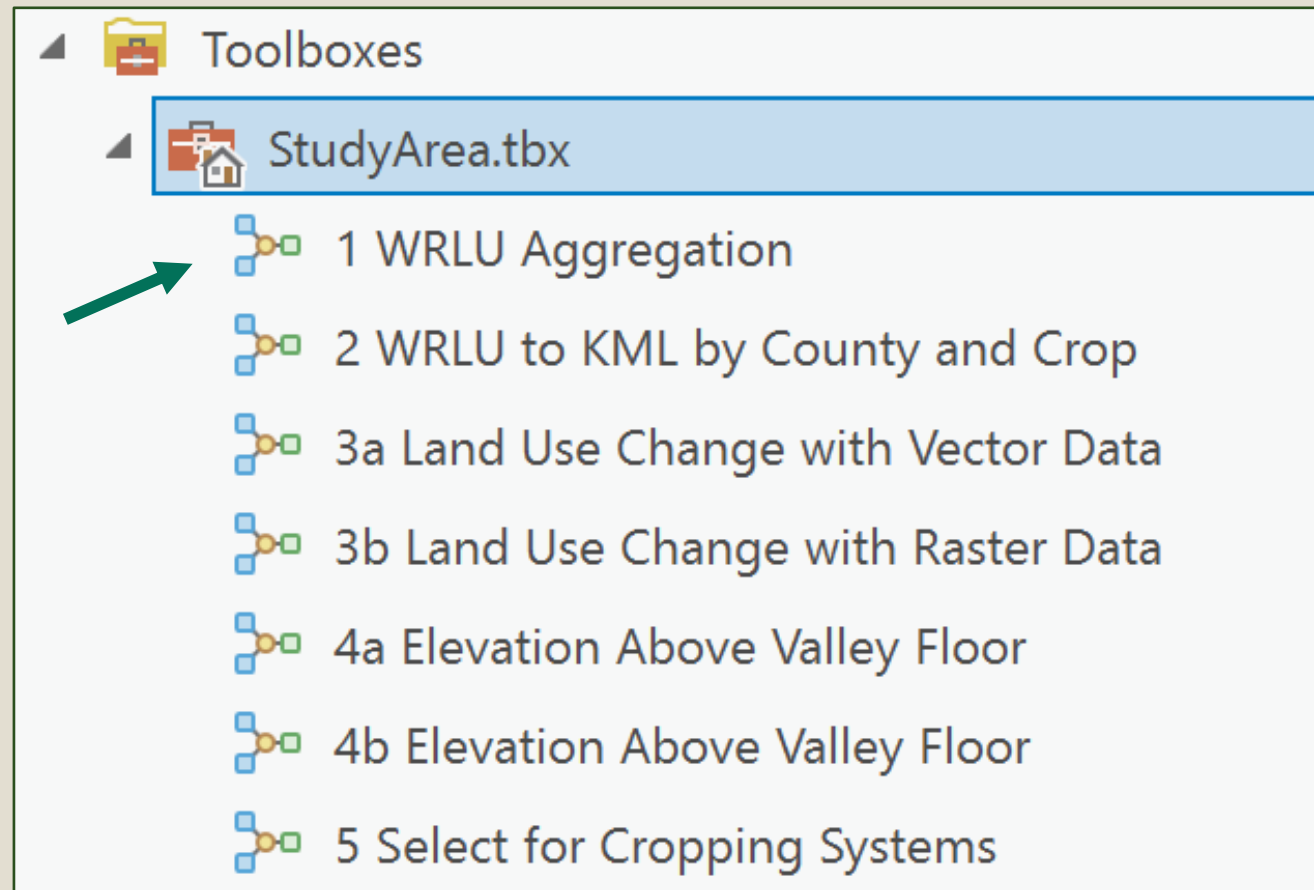
ESRI's ArcGIS Pro allows for easier ways to share data and workflows with non-GIS users by sharing Projects.



# Developed Models

Run the model in sequence.

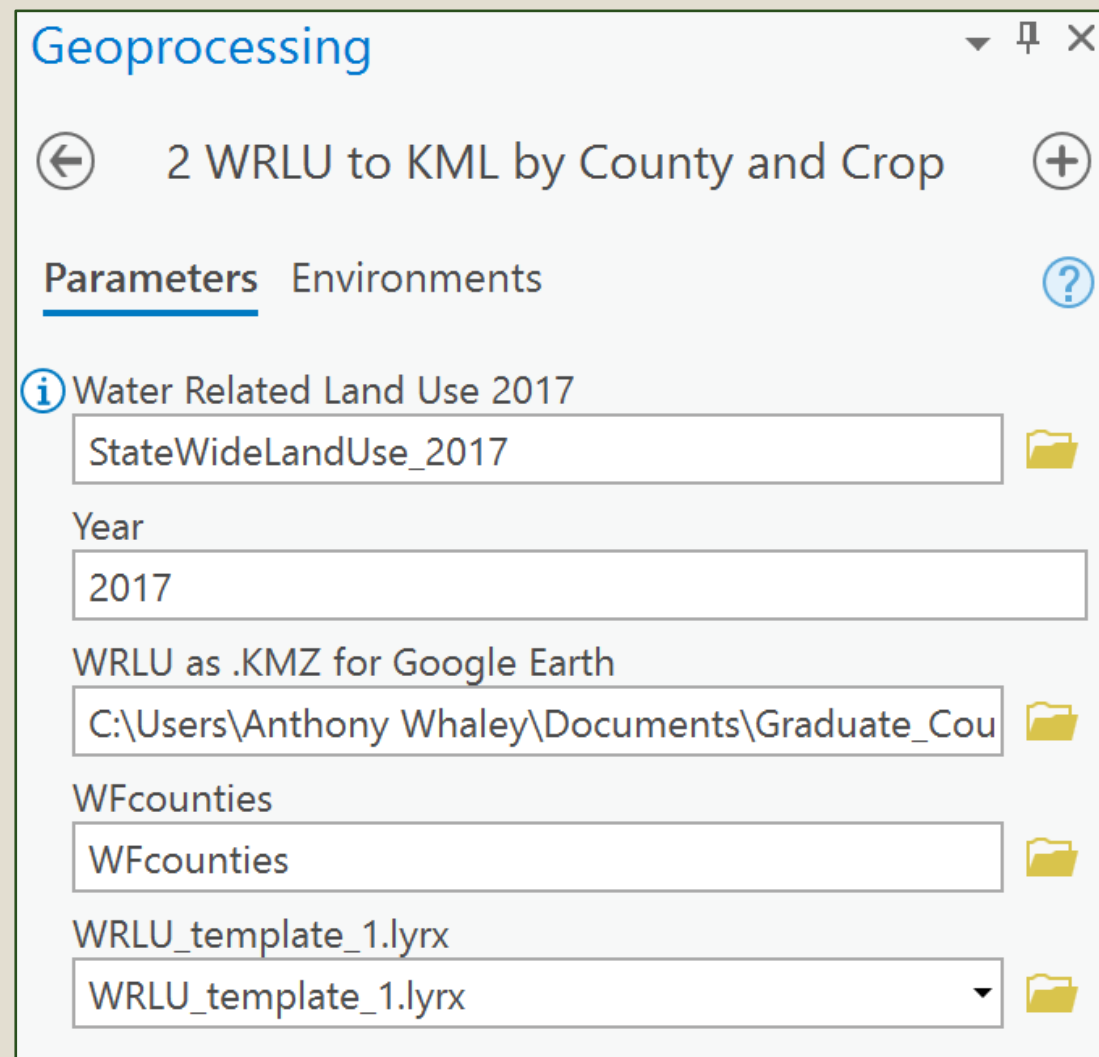
For any Study Area.





# Using each Model

The user can input their own parameters into each model!



Geoprocessing

2 WRLU to KML by County and Crop

Parameters Environments

**i** 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

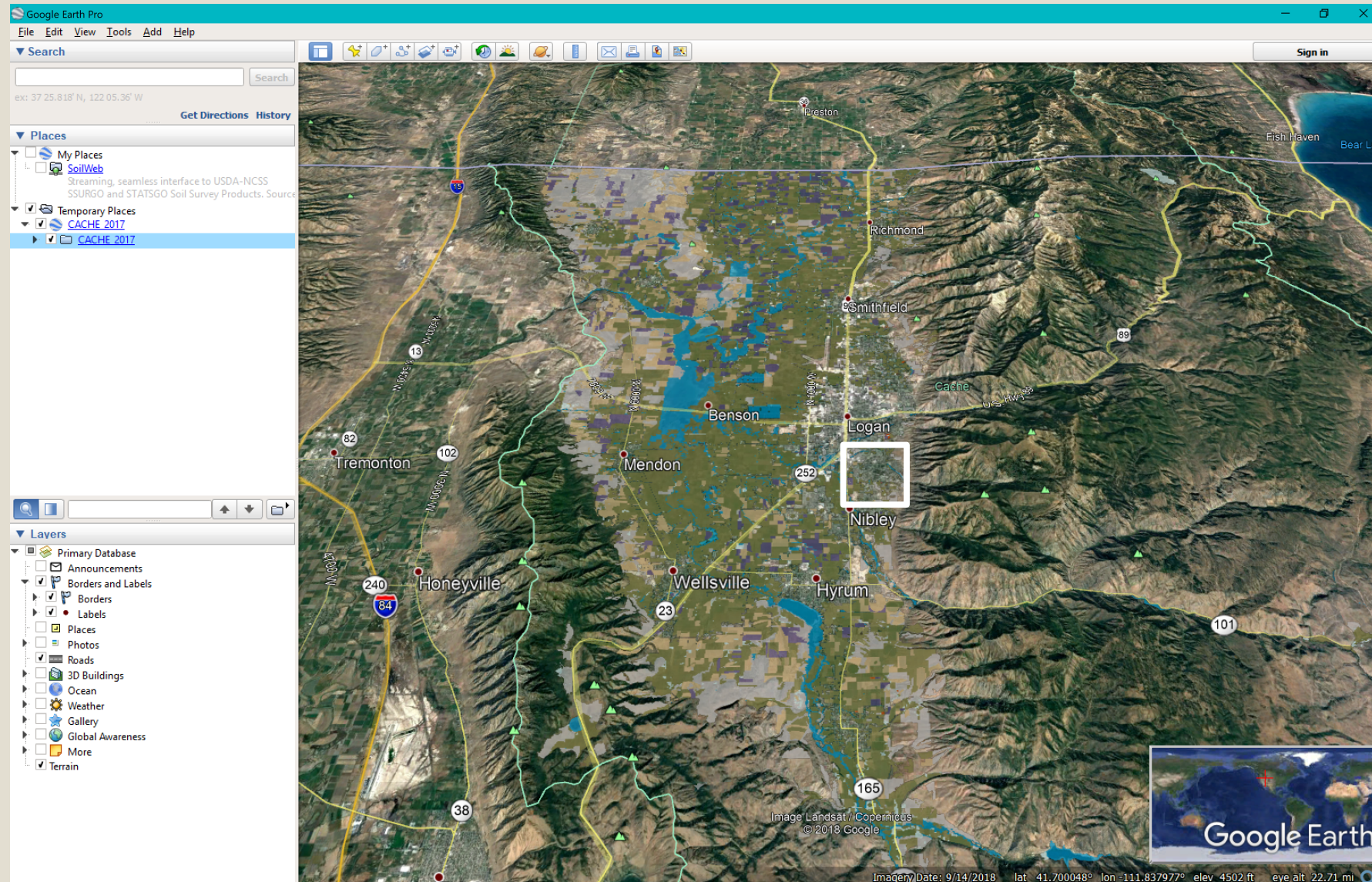
Outline

Context

Project

Methods

Results





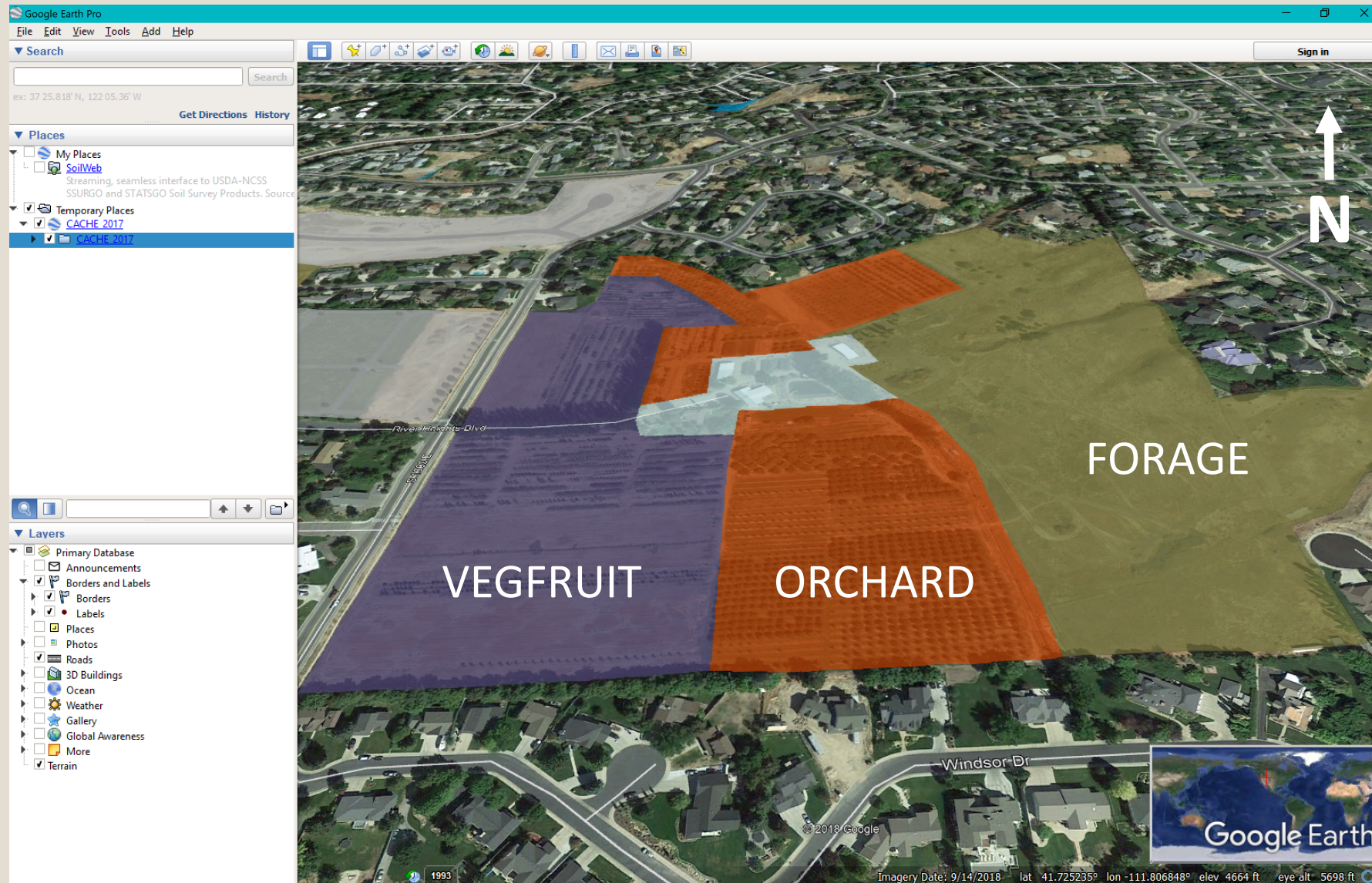
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Google Earth Pro interface showing a map of a valley area. The map displays various land use categories, including agricultural areas labeled "VEGFRUIT" and "ORCHARD", and a "FORAGE" area. A data popup window is visible, showing details for a "Developed/Open Space" feature.

**Developed/Open Space**

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

Map labels: VEGFRUIT, ORCHARD, FORAGE

Google Earth Pro interface elements: Search bar, Places list (My Places, Temporary Places), Layers list (Primary Database, Announcements, Borders and Labels, Places, Photos, Roads, 3D Buildings, Ocean, Weather, Gallery, Global Awareness, More, Terrain), Imagery Date: 9/14/2018, lat: 41.739230°, lon: -111.807186°, elev: 4618 ft, eye alt: 5823 ft.



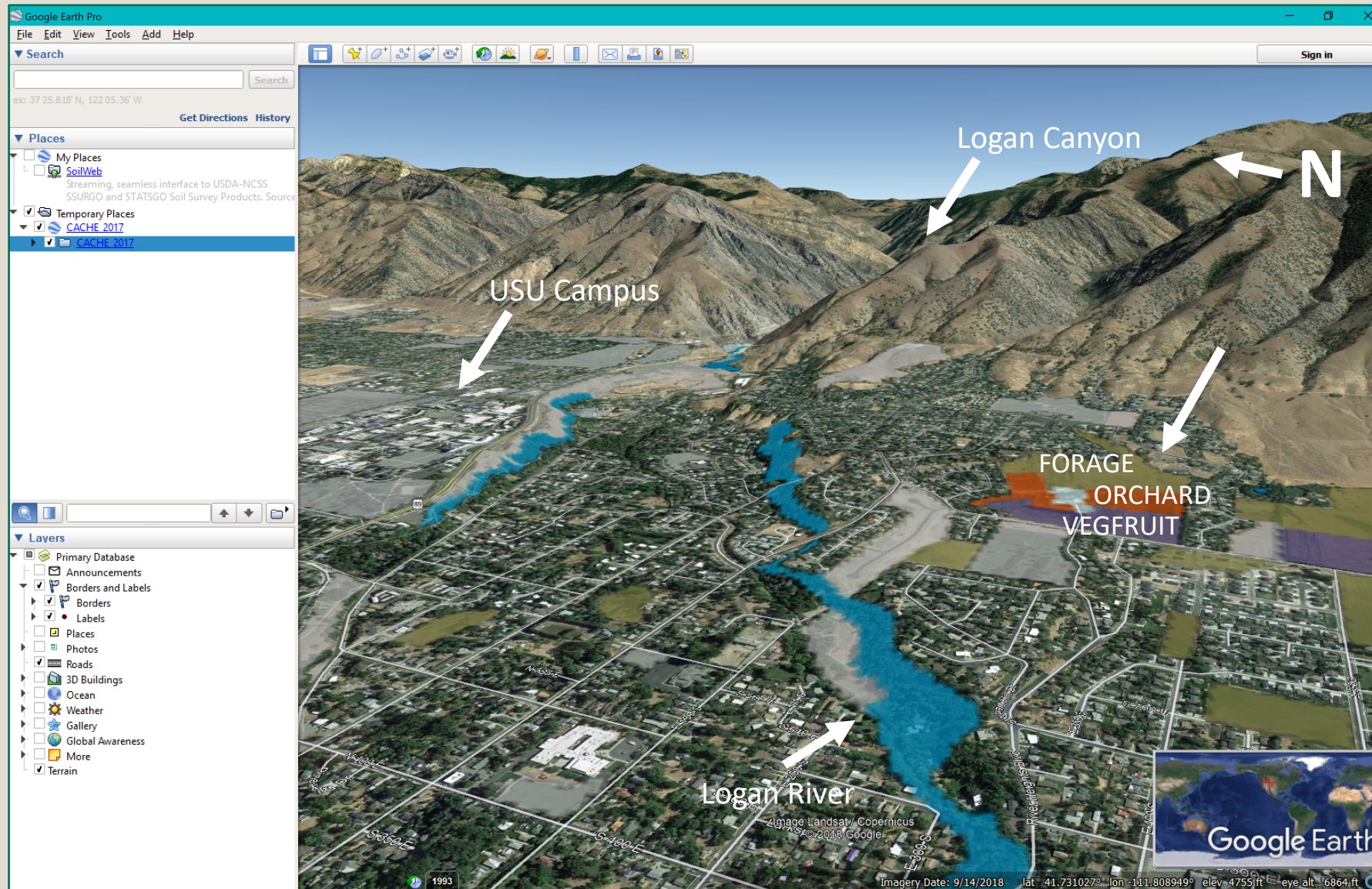
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# Conclusion

- 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!

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TIME FOR QUESTIONS