



Utilizing GIS in the Oklahoma Agricultural Land Valuation Methodology




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Agricultural Land Use

- ❖ Property used for agricultural purposes is valued with a unique process set forth by law
- ❖ “Land Use” is not the same as the typical meaning
 - 68 O.S. § 2817 C
 - OAC 710:10-3-27




Ag Land Valuation Methodology

❖ “Ag Land Record”

- Parcel + Soil + Use

❖ Valuation

- $\text{Soil Index} * \text{Use Index} * \text{Acres} = \text{Value}$



Ag Land Valuation Methodology

- ❖ For each parcel with ag use:
 - Determine soil type (USDA Natural Resources Conservation Service)
 - Determine use (Assessor's Office)
 - Authorized use classifications:
 - Cultivated Land
 - Improved Pasture
 - Native Pasture
 - Timber or Other



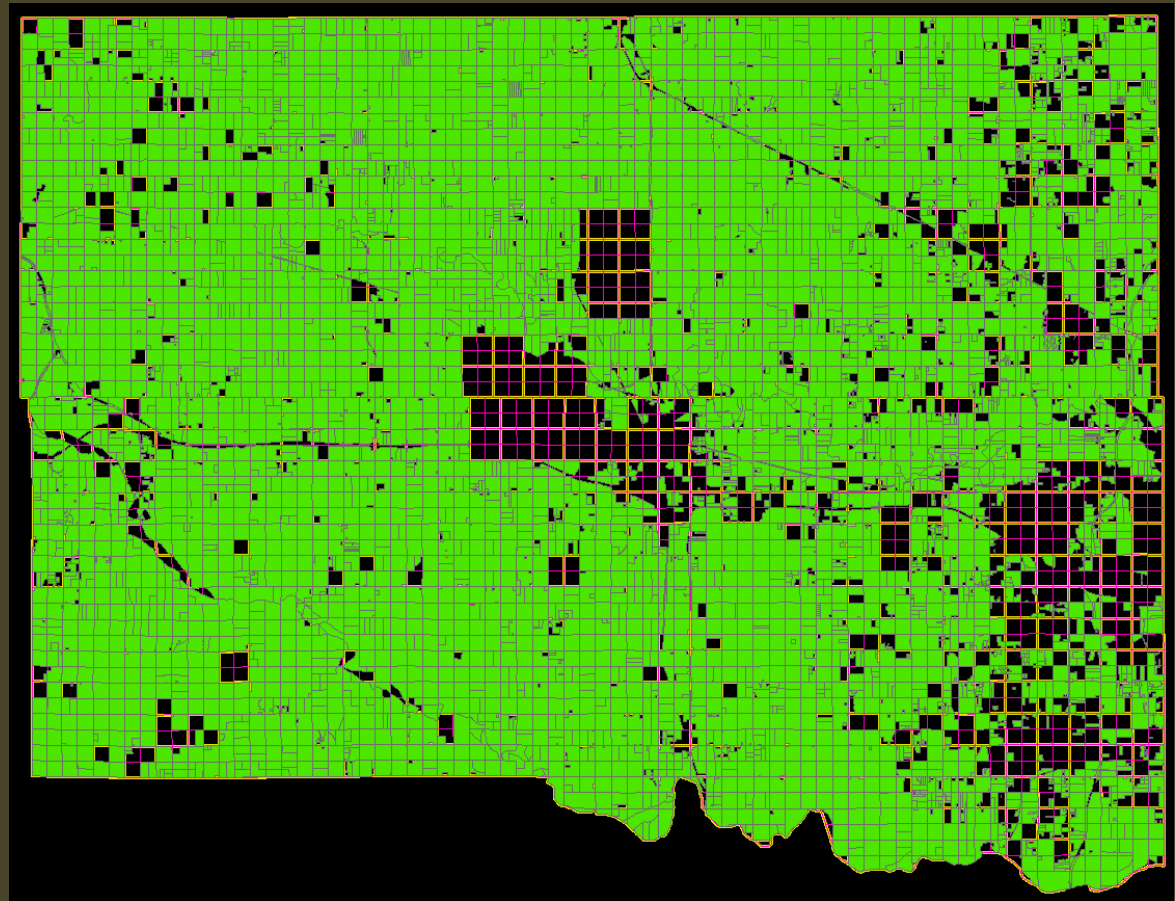
Creating Use Data

❖ Getting started

- Identify those parcels that currently have agricultural use
- Gather appropriate geographic data
 - Aerials (NAIP)
 - USDA National Agricultural Statistics Service Cropland Data Layer
 - Google Earth
- Create a polygon feature layer with a "Use" field

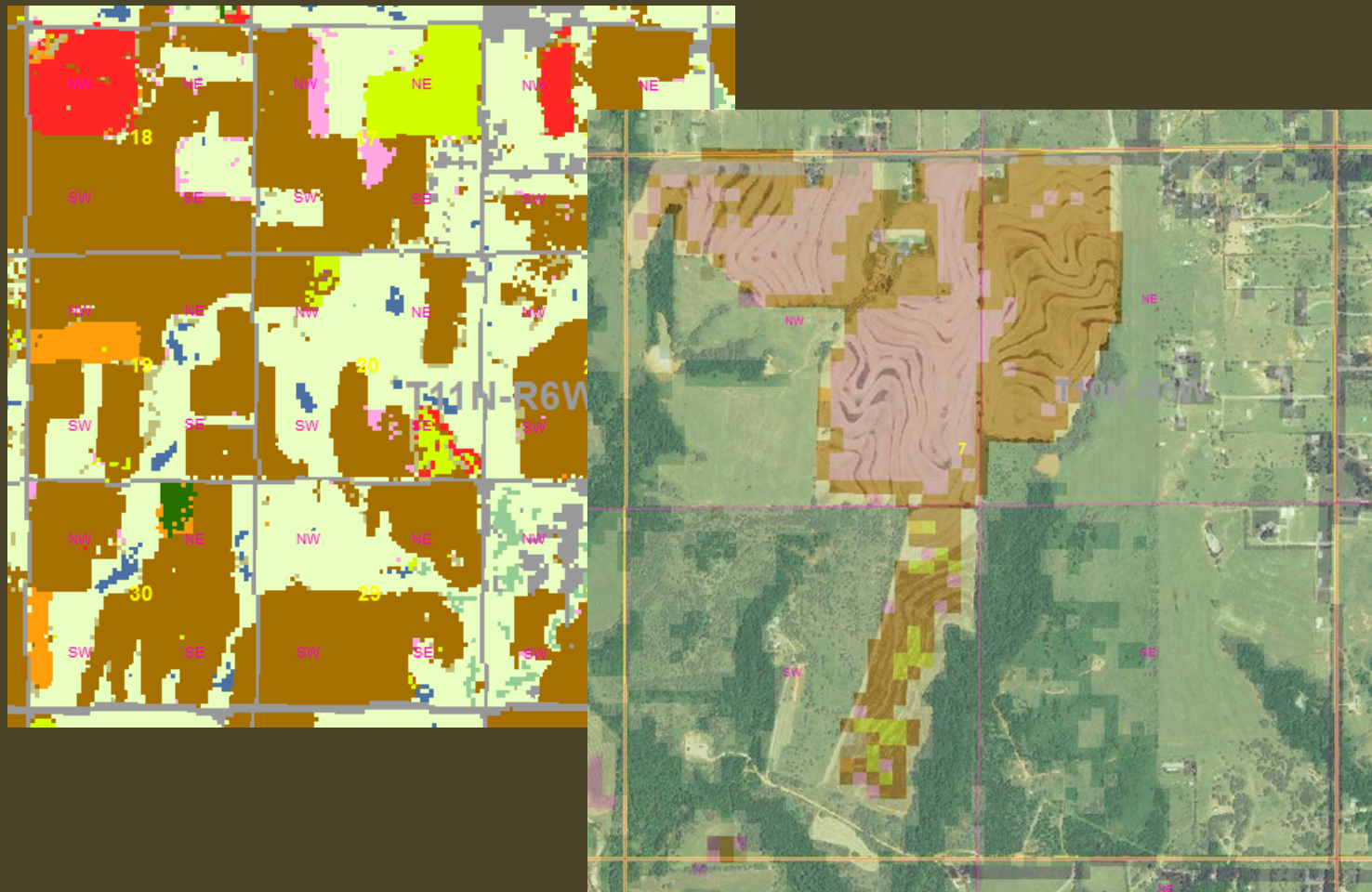
Creating Use Data

- ❖ Identify parcels that currently have agricultural use



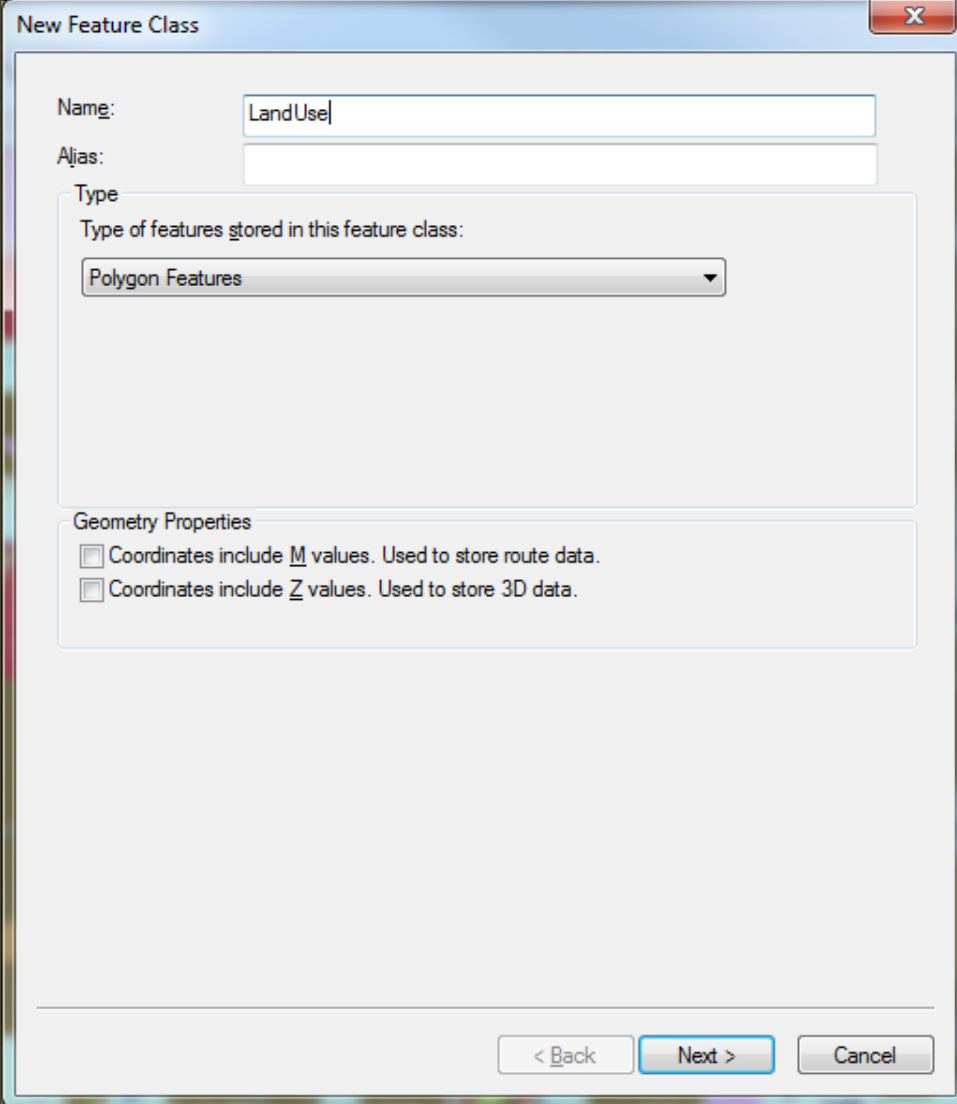
Creating Use Data

❖ USDA Cropland and NAIP Data



Creating Use Data

- ❖ Create use feature class



The screenshot shows the 'New Feature Class' dialog box. The 'Name' field contains 'LandUse'. The 'Alias' field is empty. The 'Type' section shows 'Type of features stored in this feature class:' with a dropdown menu set to 'Polygon Features'. The 'Geometry Properties' section has two unchecked checkboxes: 'Coordinates include M values. Used to store route data.' and 'Coordinates include Z values. Used to store 3D data.'. At the bottom are buttons for '< Back', 'Next >', and 'Cancel'.

New Feature Class

Name: LandUse

Alias:

Type

Type of features stored in this feature class:

Polygon Features

Geometry Properties

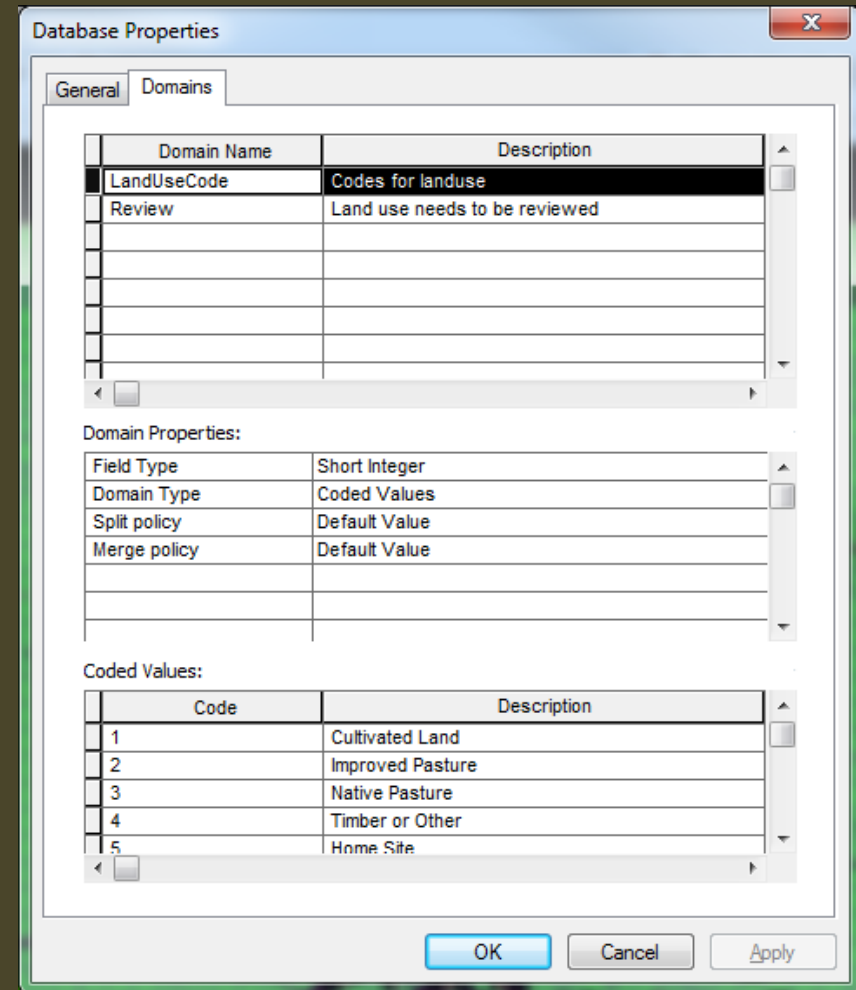
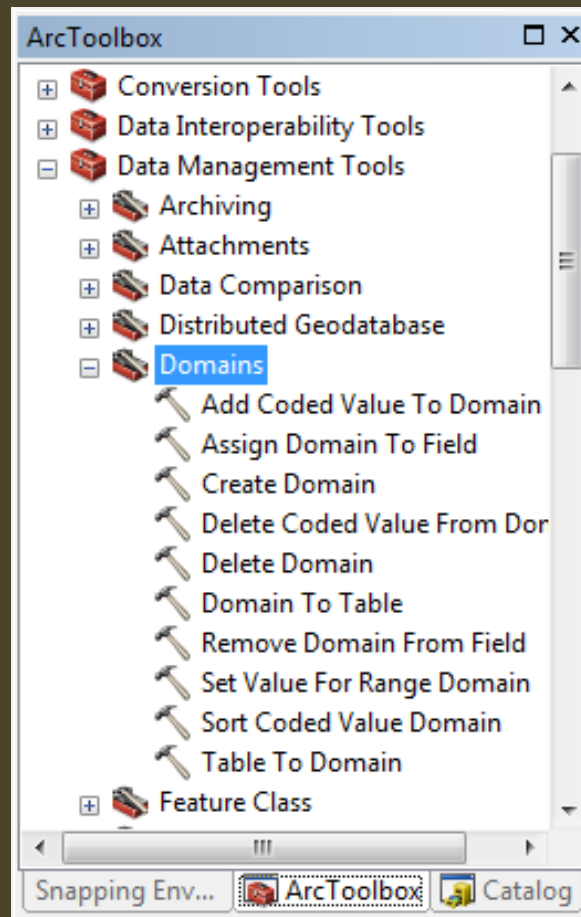
☐ Coordinates include M values. Used to store route data.

☐ Coordinates include Z values. Used to store 3D data.

< Back Next > Cancel

Creating Use Data

❖ Domains for use classifications...



Creating Use Data

- ❖ Domains for use classifications can make data creation faster

Table

LandUse2015

OBJECTID *	Shape *	LandUseCode	Shape_Area
781	Polygon	Cultivated Land	6941034.825
		<Null>	
		Cultivated Land	
		Improved Pasture	
		Native Pasture	
		Timber or Other	
		Home Site	
		Non Ag, Commercial or	
		Oil Site	
		Wind Turbine North	
		Roads	
		Non Ag, Undecided	
		Railroad	
		Wind Tubine South	

PARCEL_MASTER LandUse2015 PLSDissolve AgParcelUseChange

23155 Selected)



Creating Use Data

- ❖ Two ways we found to start creating use polygons
 - “Create from Scratch”
 - Create use polygons where needed as you go
 - “Append and Cut”
 - Append either your PLSS grid or the parcels that need land use to your use layer and use “Cut Polygon” tool



Creating Use Data

❖ "Create From Scratch" Method

- Pros
 - Editor options can prompt you for a use type when you finish
 - Areas can be larger than one parcel if they need to be
- Cons
 - Difficult to maintain correct topology
 - Slower data creation



Creating Use Data

❖ “Append and Cut” method

- Pros

- Faster data creation
- Topology is already taken care of (if your parcels or PLSS data have no topology errors)
- “Donut holes” are easy to create

- Cons

- “Cut Polygons” tool can be difficult to use
- Any errors in starting data is carried over

Creating Use Data

❖ Start tracing!



Classifying Use Data

❖ NAIP Aerials



Classifying Use Data

❖ USDA Cropland Data Layer



Classifying Use Data

❖ Google Earth

- Historic Imagery





Land Use Quality Control

❖ Topology

- No Gaps
- No Overlaps



Land Use Topology Issues

❖ Gaps

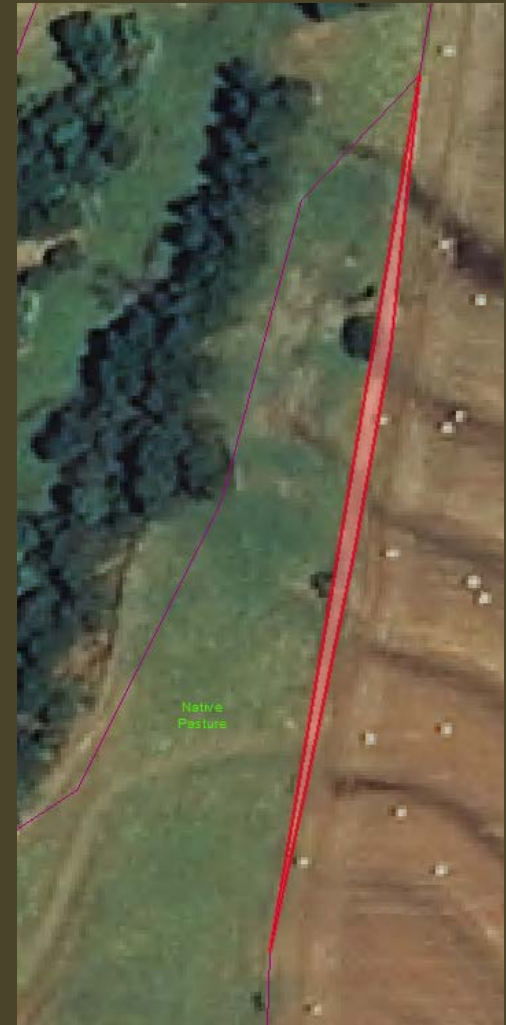
- Mistakes in Data Creation
- Parcels that don't need land use (Exception)



Land Use Topology Issues

❖ Overlaps

- “Donut Holes”
- Mistakes in data creation





Working With USDA Data

❖ USDA Natural Resources Conservation Service soil data

- Areas with non-soil classifications
 - DAM, DUM, M-W, PIT, W
- Need a way to “grow” the surrounding soil types into the non-soil areas
 - Thiessen or Voronoi polygons



Working With USDA Data

- ❖ USDA National Agricultural Statistics Services Cropland Data Layer
 - Developed from classifying remotely sensed data (Landsat, Deimos-1, etc.)
 - 30 meter ground resolution
 - 80.3% overall accuracy for 2014 Oklahoma layer

http://www.nass.usda.gov/research/Cropland/metadata/metadata_ok14.htm

Working With USDA Data

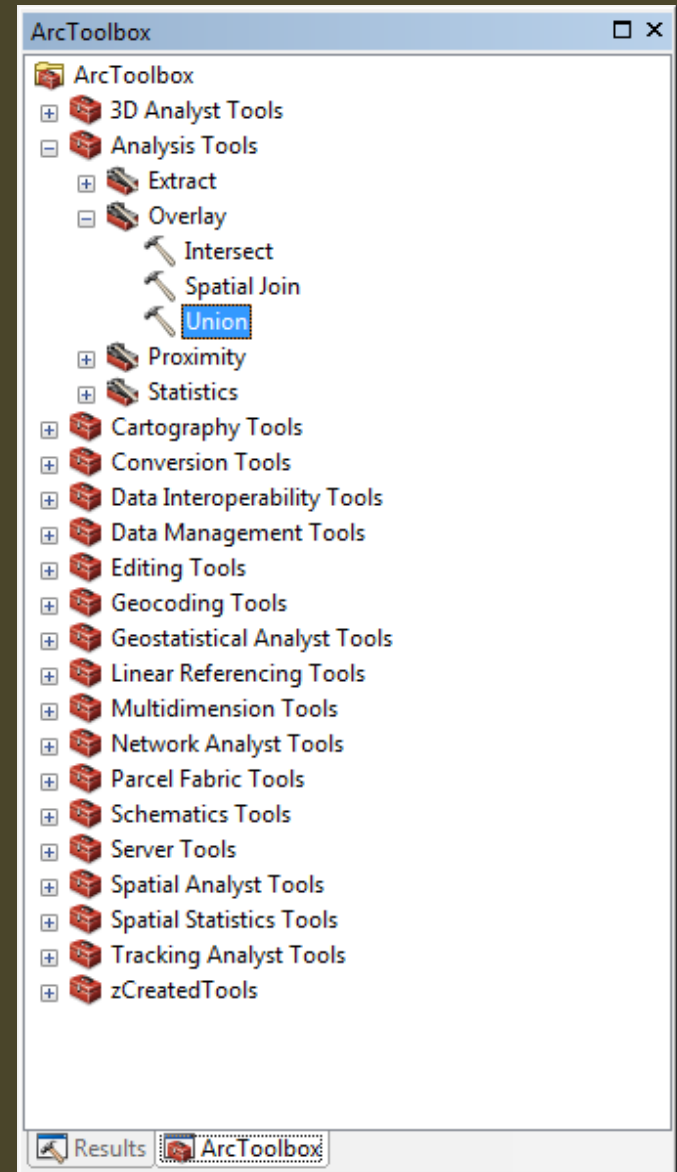
❖ USDA Cropland Data Layer



Creating “Ag Land Records”

❖ “Union” tool

- Creates a “union” between all input datasets (Parcels, Soils, Use)
- Any line in any input will exist in the output
- All attributes can be carried over in output



Initial Quality Control

❖ Stop for
quality
control

- No Parcel #
- No Soil
- No Use





Initial Quality Control

- ❖ No parcel # in some “Union” output features
 - Your soil data or land use data extend outside the boundaries of your parcel data.
 - Use “Clip” tool to clip your use and soil by the parcels you want to analyze



Initial Quality Control

- ❖ No soil type in some “Union” output features
 - Mostly found along the county line where the USDA’s county line doesn’t match the Assessor’s county line
 - Edit your soil layer and extend the soils along the county line to your county line



Initial Quality Control

- ❖ No land use in some “Union” output features
 - No land use exists in the area being analyzed
 - Edit your land use data to cover the area that was missing (good way to check quality of your use data)

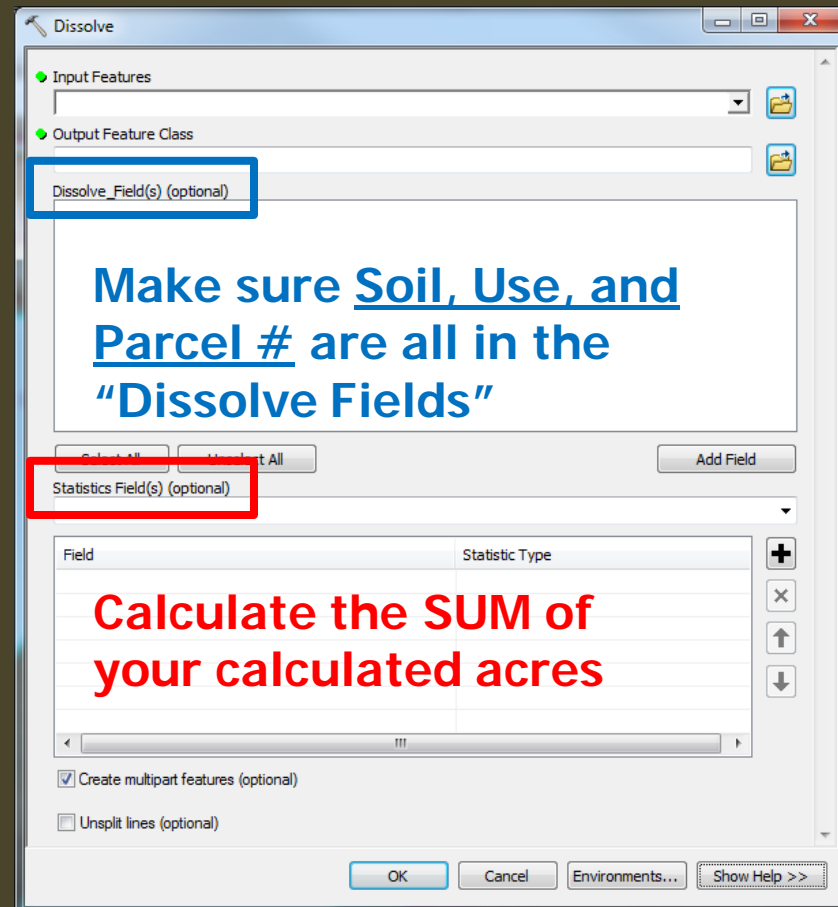
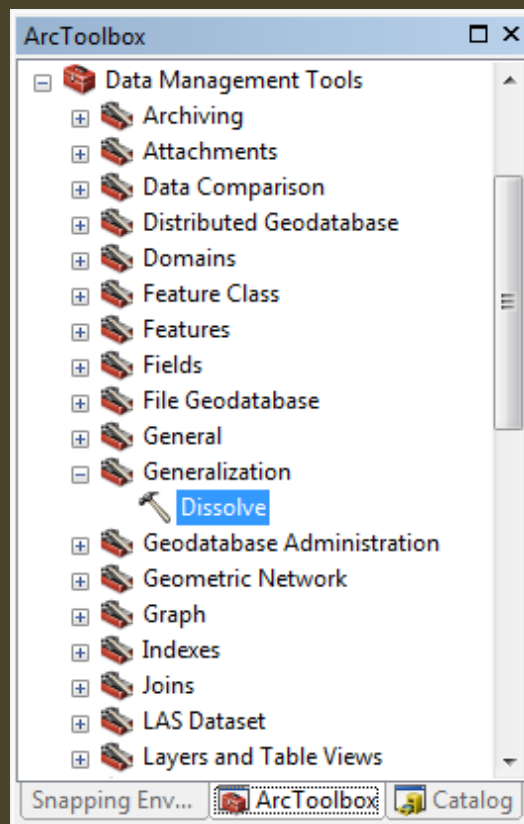
Creating “Ag Land Records”

- ❖ Raw output of “Union” tool will have too many records to put into your CAMA system



Creating “Ag Land Records”

- ❖ Use the “Dissolve” tool to recombine those records that have the same parcel #, use, and soil





Creating “Ag Land Records”

- ❖ Getting acreage for each “Union” output feature
 - “Rubber Sheet” problem with parcels
 - Deeded Acres \neq Measured Acres
 - “Percentage Method”

The image is a vertical strip on the left side of the slide. The top half shows a dense field of bright yellow flowers, likely rapeseed, with green stems. The bottom half shows a close-up of golden-brown wheat stalks with long awns.

“Percentage Method”

- ❖ For each feature in your “Union” output, you will need to:
 - Calculate the sum measured area of all features with the same parcel #
 - Find what percentage each feature constitutes of that whole measured area
 - Multiply that percentage by the “Deeded Acres” from the CAMA system

Creating "Ag Land Records"

❖ Ready to export table

Table

PLSDissolve

	Account *	Soil Type Code	Use Code	Shape_Area	AglandRecordValue	Prcnt of Recorded Size	Acres
	090000001	DUD	TMBR	5.196 Ac.	\$393.11	3.85%	5.22
	090000001	GPE	TMBR	5.012 Ac.	\$273.84	3.71%	5.04
	090000001	KFB	TMBR	2.474 Ac.	\$327.58	1.83%	2.49
	090000001	NAD	NTV PST	4.227 Ac.	\$424.61	3.13%	4.25
	090000001	NAD	TMBR	49.354 Ac.	\$3,837.45	36.54%	49.62
	090000001	NAD2	NTV PST	4.213 Ac.	\$377.41	3.12%	4.24
	090000001	NAD2	TMBR	3.193 Ac.	\$221.40	2.36%	3.21
	090000001	NAD3	NTV PST	11.844 Ac.	\$771.68	8.77%	11.91
	090000001	NAD3	TMBR	31.756 Ac.	\$1,601.62	23.51%	31.93
	090000001	PKB	NTV PST	9.068 Ac.	\$1,673.95	6.71%	9.12
	090000001	PKB	TMBR	8.734 Ac.	\$1,248.01	6.47%	8.78

0 (0 out of 47009 Selected)



Non-Ag Use

❖ Areas that are not used for agricultural purposes as defined by law

- Home sites?
- Commercial or industrial use?
- Petroleum production?

Non-Ag Use

❖ Forcing specific acreages for non-ag





Non-Ag Use

❖ Forcing specific acreages

- Add field to land use for recording desired size
- Dissolve all parts with forced acres per parcel and be sure to get the sum of all forced acres
- Subtract total forced acres from the deeded acres
- Apply ag use percentages to the difference



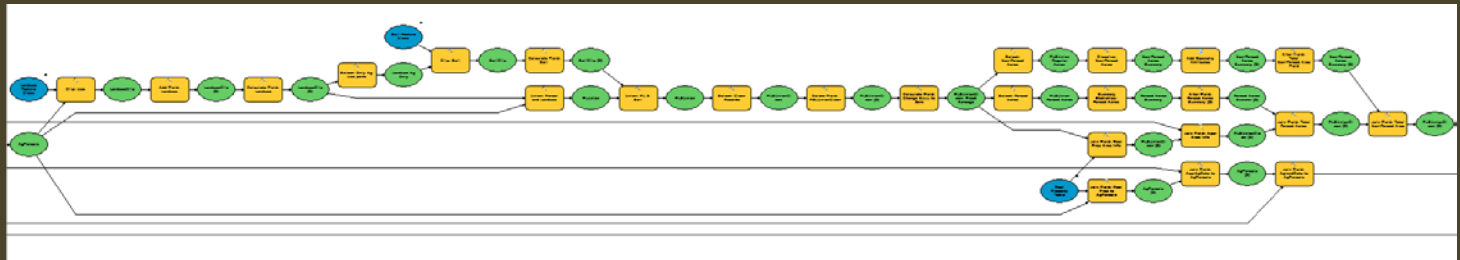
Non-Ag Use

❖ Reminders for non-ag use

- Topology with parcel data
- Non-ag areas don't need soil types
- Large differences between deeded acres and measured acres will create large differences in percentage calculated ag land records

[illegible]

-





Use Classification Quality Control

- ❖ On-site inspection
- ❖ Questionnaire to owner/lessee
- ❖ Updated aerials/land cover data*
- ❖ Comparison with previous years*



Use Classification Quality Control

❖ Updated aerials/land cover data

- Create process to update land use periodically with new data
- Same basic process as initial build



Use Classification Quality Control

- ❖ Comparison with previous years
 - Comparing old ag land use data with new helped with quality control
 - Can use geographic data or tabular data for comparison



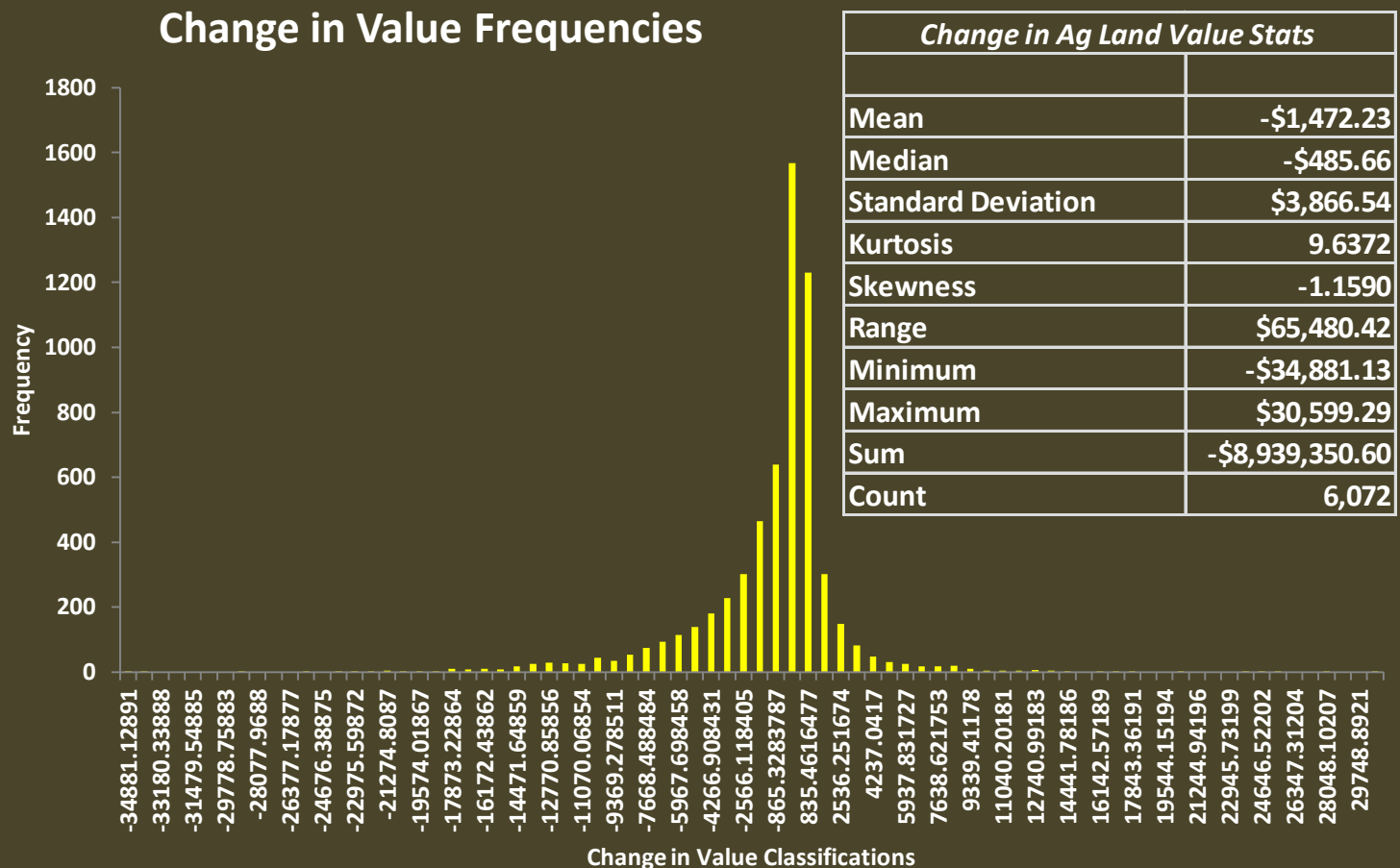
Comparison With Older Data

❖ Comparison using total ag land value

- Large changes in value may signal errors in classification
- Need to check with other resources to be sure

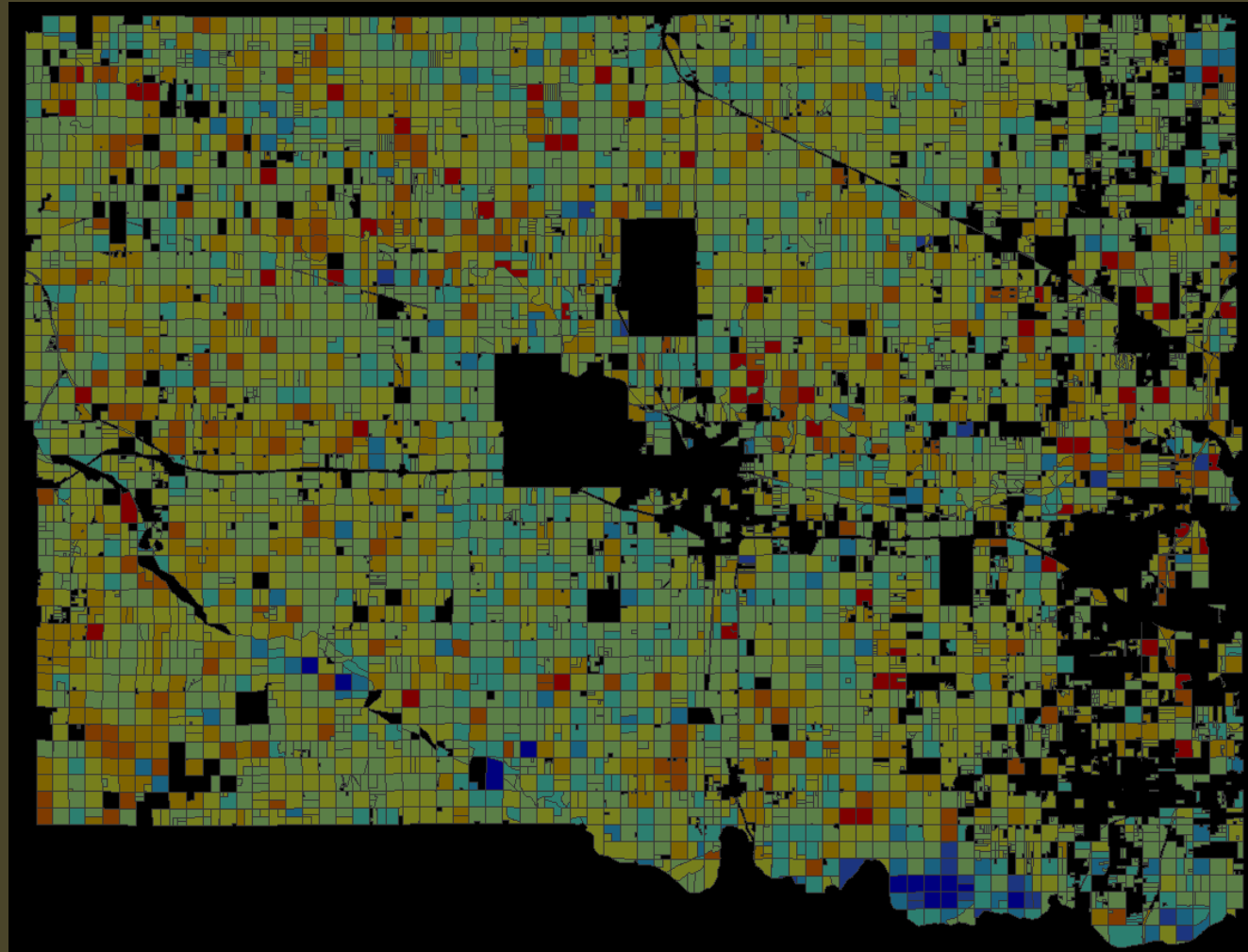
Comparison With Older Data

❖ Change in value descriptive statistics



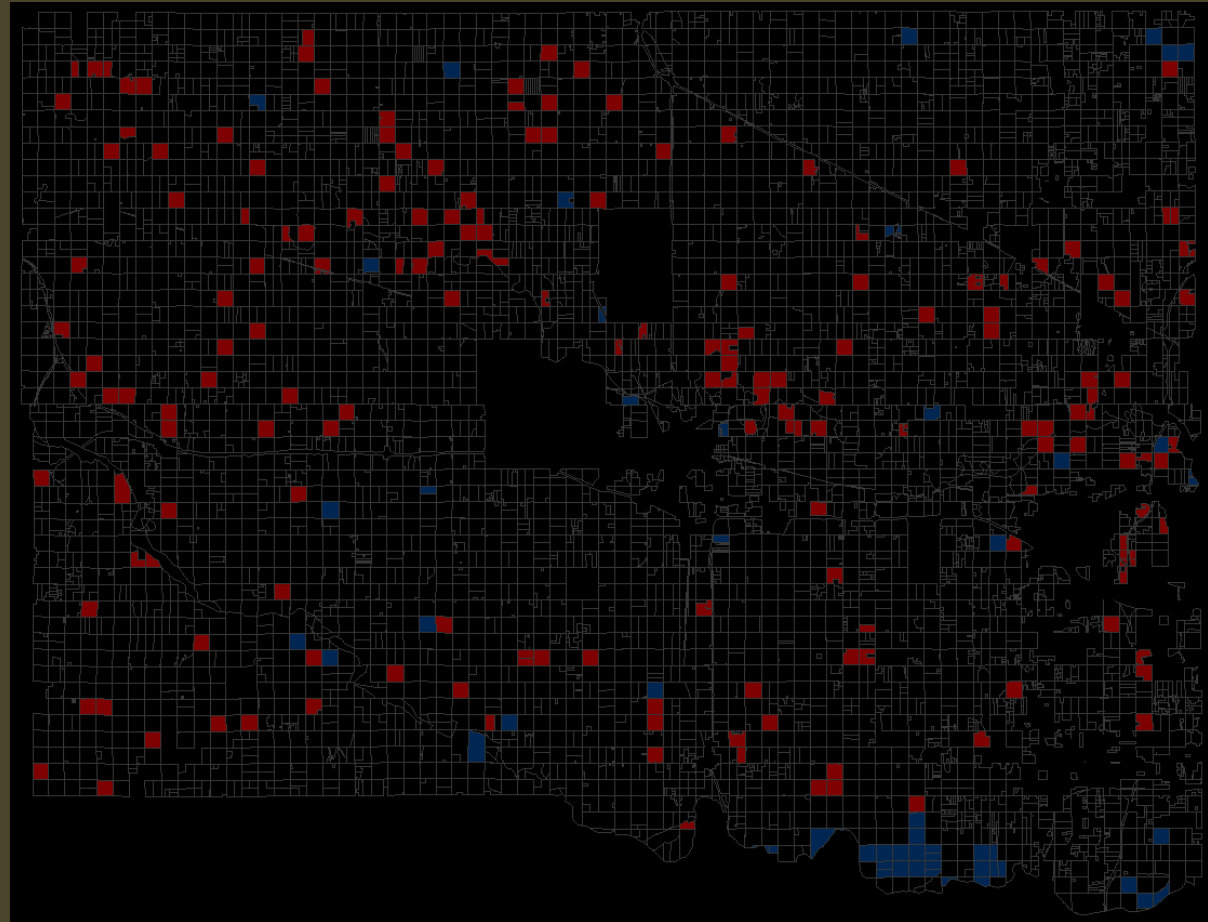
Comparison With Older Data

❖ Change in ag land value



Comparison With Older Data

- ❖ Standard deviation: change in ag land value





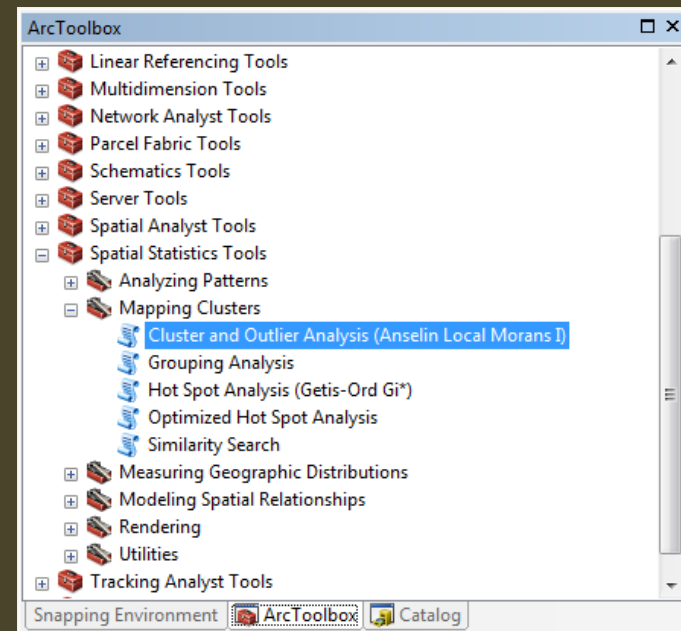
Comparison With Older Data

- ❖ Change in any of the 4 qualified classifications
 - Compare number of acres in use types
 - Large changes may signal an error in classification

Comparison With Older Data

❖ Spatial statistics

- “Cluster and Outlier Analysis”
- Use the change in value or change in specific use acres.





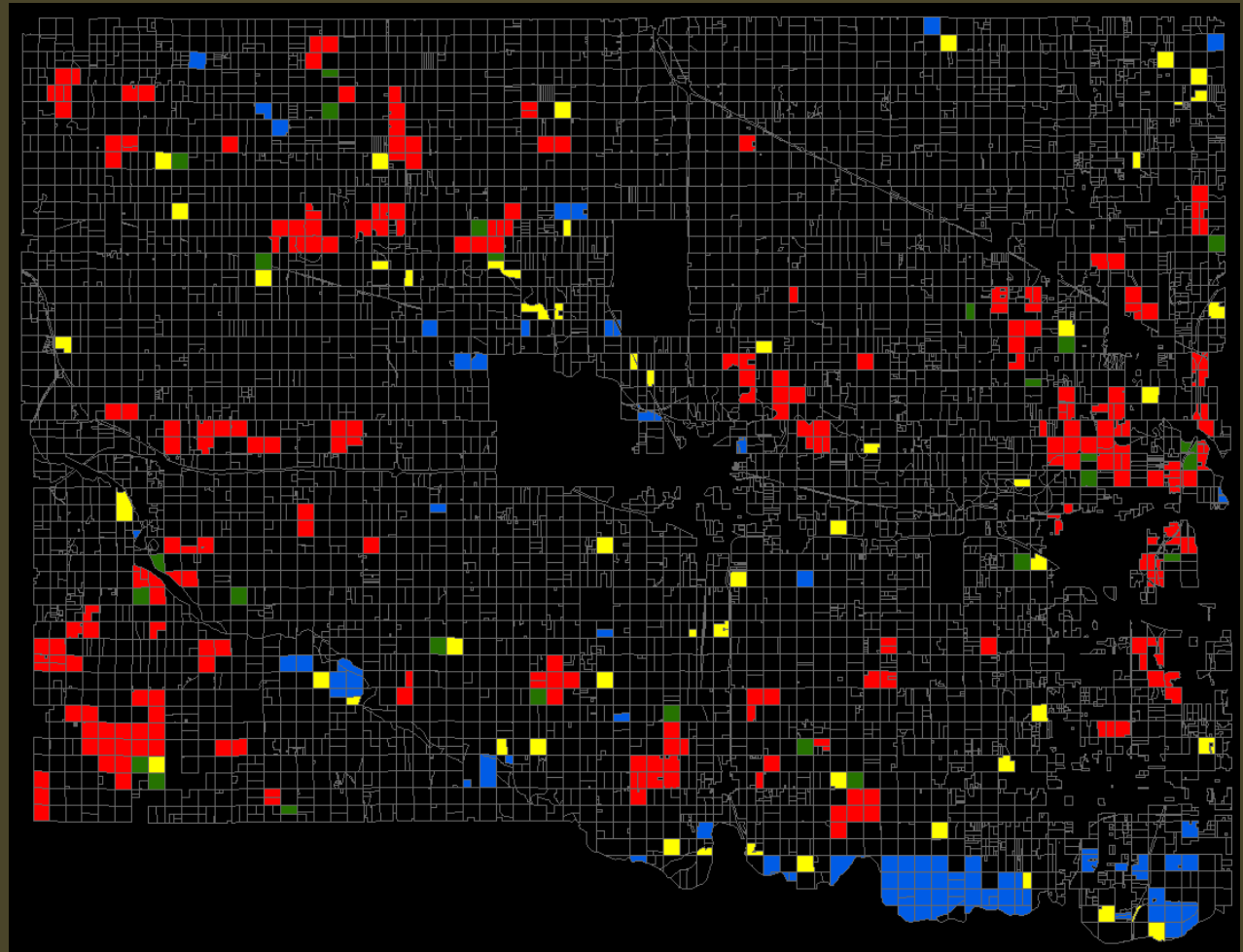
Comparison With Older Data

❖ Cluster and outlier analysis

- Looks for statistically significant areas where:
 - High values are clustered
 - Low values occur near high clusters
 - Low values are clustered
 - High values occur near low clusters
- High or Low Clusters may signal classification errors

Comparison With Older Data

❖ Cluster and outlier analysis





Using GIS Analysis Results

❖ Output data as a table

- Table can be used as input for CAMA system
- Getting data into CAMA system will depend on which system is used



Questions?

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