USDA SERVICE CENTER AGENCIES
Geographic Information System (GIS)
OVERVIEW

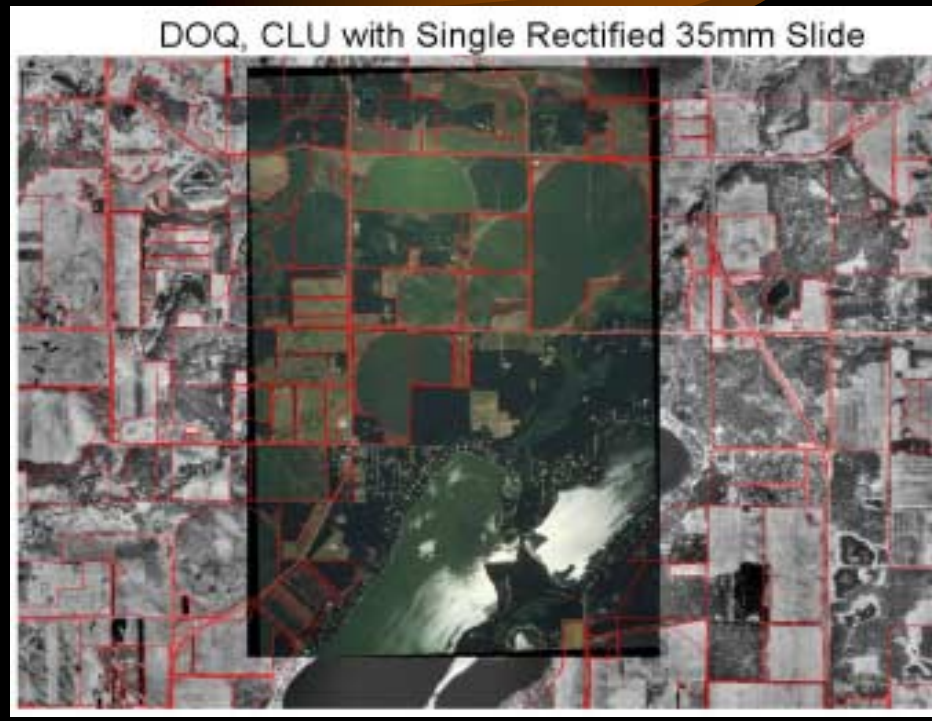
"No other technology integrates, synthesizes, and displays complex agricultural information and relationships as completely or intuitively as GIS. GIS brings together people, data, and technology to support better decision making."

GIS Strategy Document Dec. 2001

Enlarged and Scaled Aerial Photography has been used for many years to record and measure farm information.

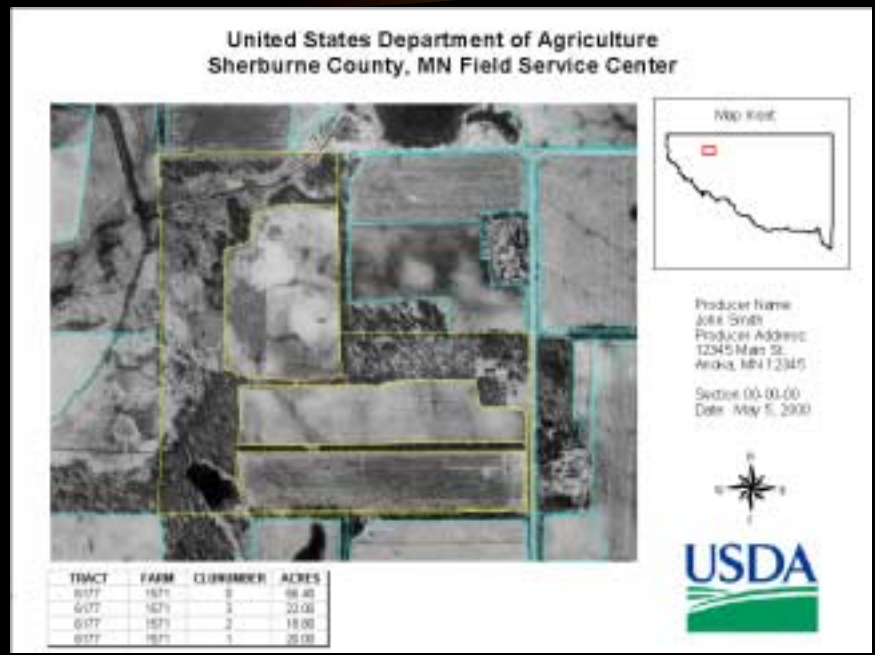
GIS Technologies Will Replace Manually Intensive Processes

Manual Method



GIS - Faster, Better, Cheaper

Copies Can Be Replaced by Digital Reproductions

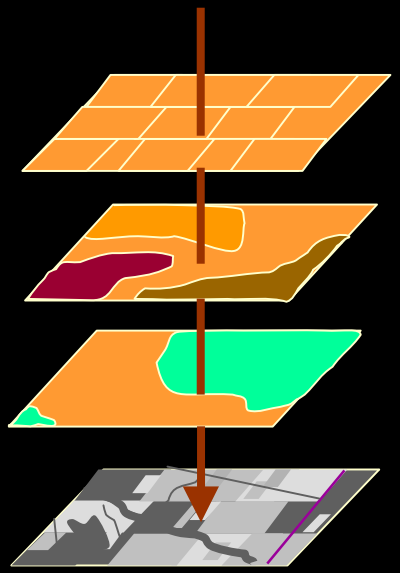


Field Measurements Can be Made By GPS Instead of Wheel

Measurements using Wheel

GPS - Faster, Better, Cheaper

USDA Geospatial Data Themes



Common Land Unit

Soils

Demographics

Orthoimagery

FSA Focus for Other Themes:

- CLU Based Themes
  - Land Use/ Land Cover
  - Owner/Operator Links
  - Easements
  - CRP
  - HEL
- Wet Lands Point Data
- Digital Photography
- Satellite Imagery
- Public Land Survey
- Daily Weather Data

Lower Priority Themes:

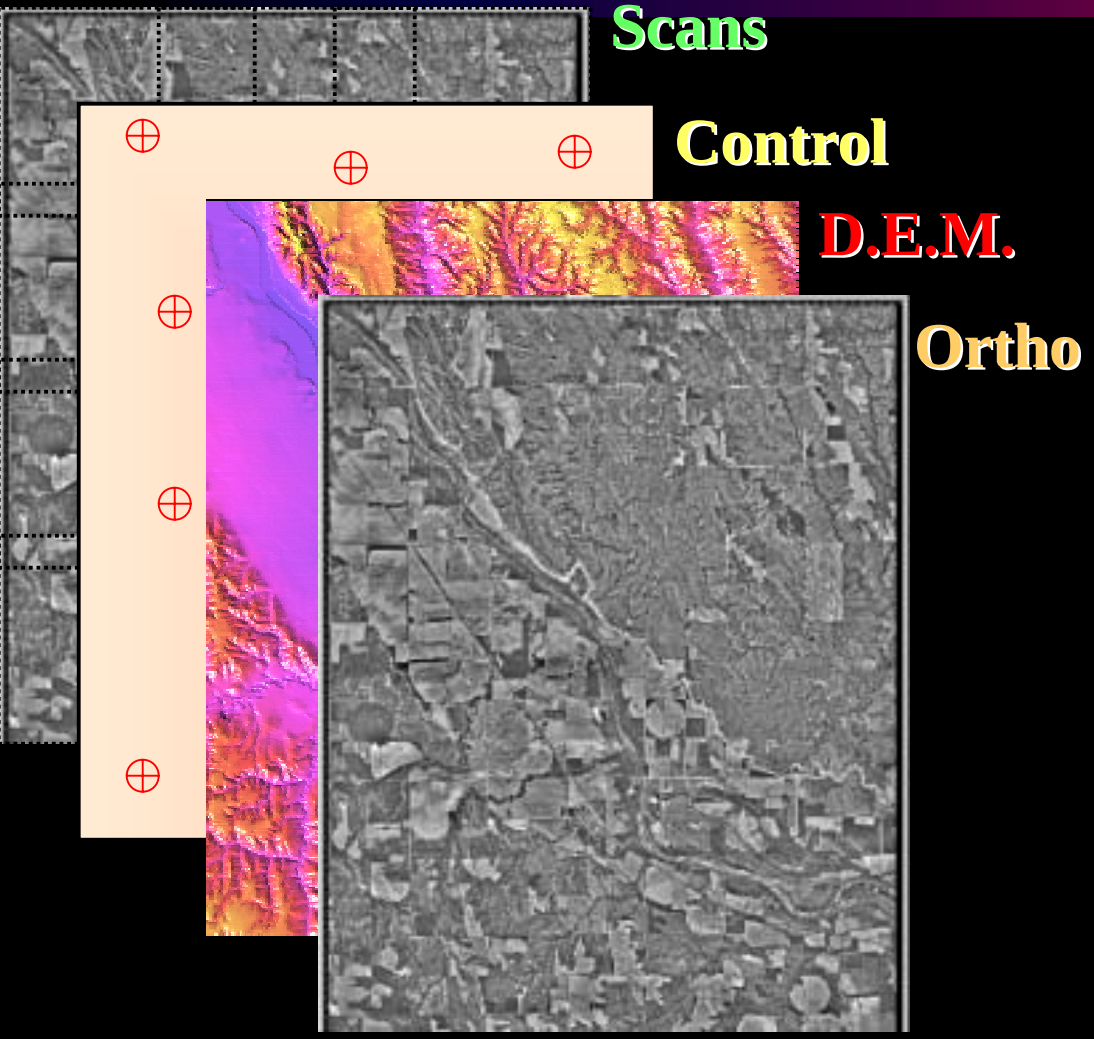
- Digital Raster Graphics
- Geographic Names
- Government Units
- Elevation
- Watershed Boundaries
- Transportation

What is Digital Orthoimagery?

Mountain View, CA
Source: Space Imaging EOSAT

- Derived product from aerial photography
- Digital form
- Displacements removed
- Combines image characteristics with accuracy and scale of a map

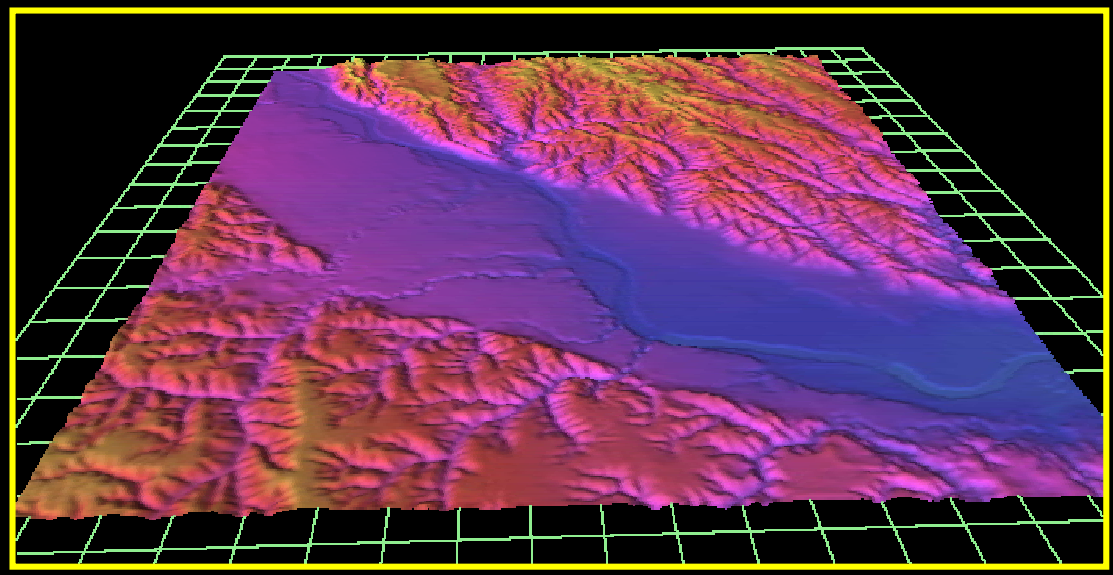
How Digital Ortho Images Are Created:



Digital Ortho Imagery are created by taking *scanned* images (I.E. NAPP Film), incorporating *control points* derived from *GPS* or from land survey, and draping the imagery over a **D**igital **E**levation **M**odel (**DEM**).

The software then projects the *control points*, *DEM*, and *imagery* and creates a **Digital Ortho Photograph**.

DEM's - *Digital Elevation Models*



Digital Elevation Models or **DEM's** are raster data that represent the terrain or slope of a given area in a mathematical model.

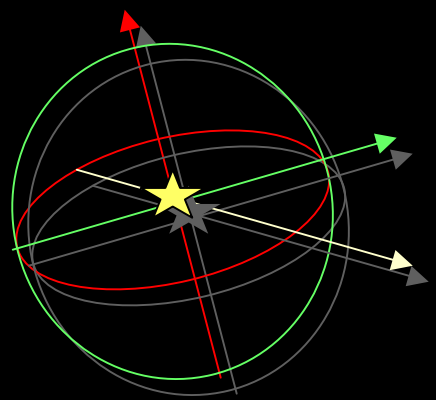
DEM's are registered to the ground through a geographic projection. **DEM's** have three coordinate readings;

X, Y, Z.

X: Latitude

Y: Longitude

Z: Elevation

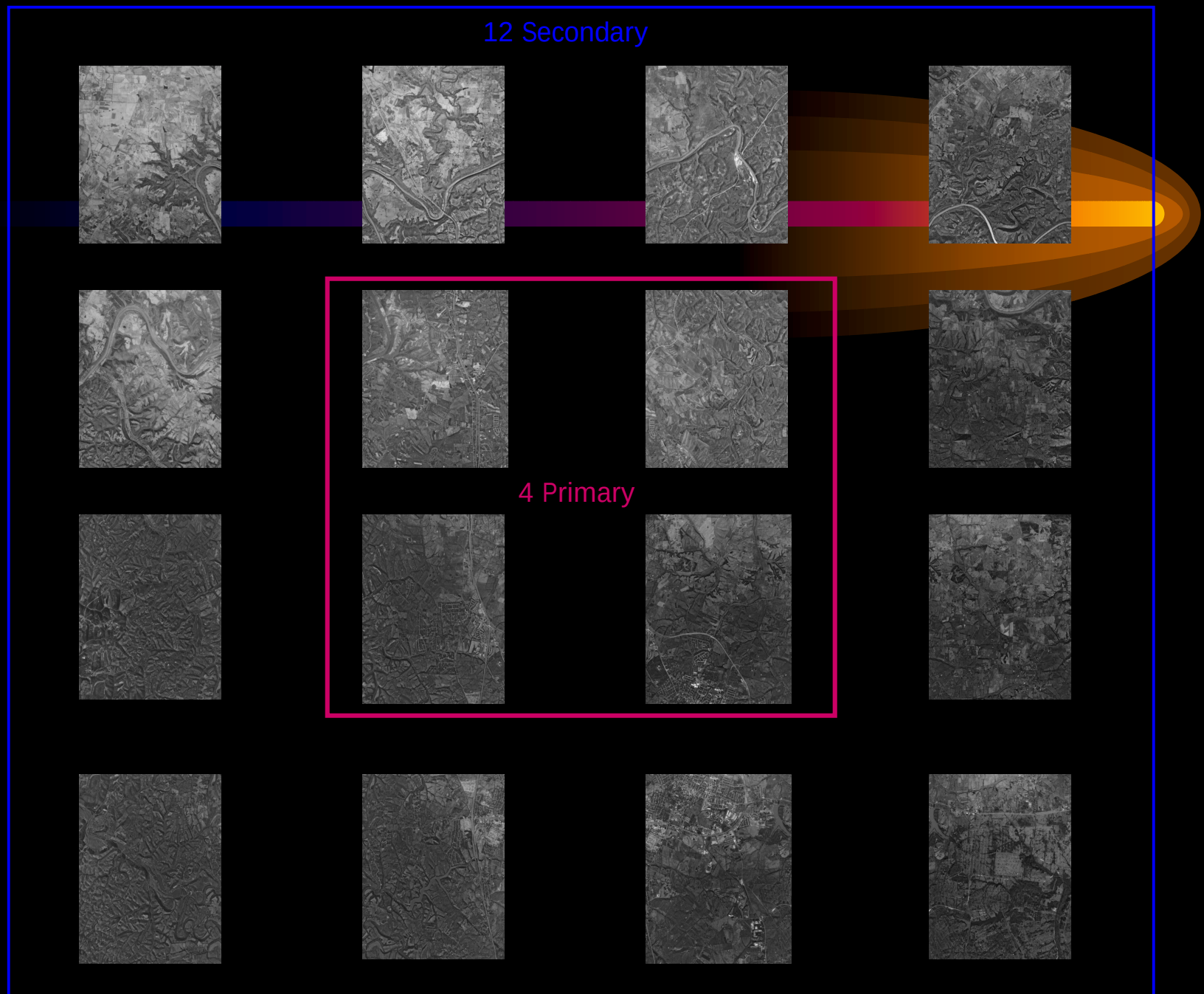


DOQQ

(USGS Digital Ortho Quarter Quad)

- 3.75’ x 3.75’Minute Format
- 1 Meter Resolution

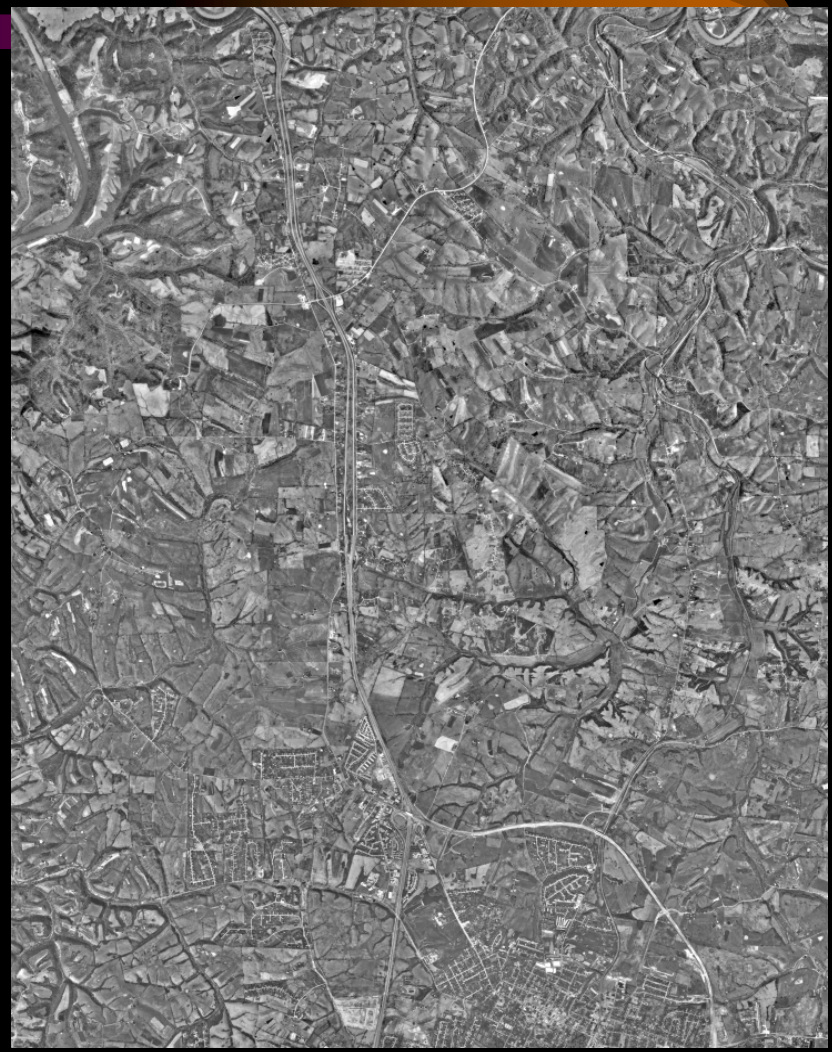
16 DOQQ's Seamed Together = MDOQ



MDOQ Tile

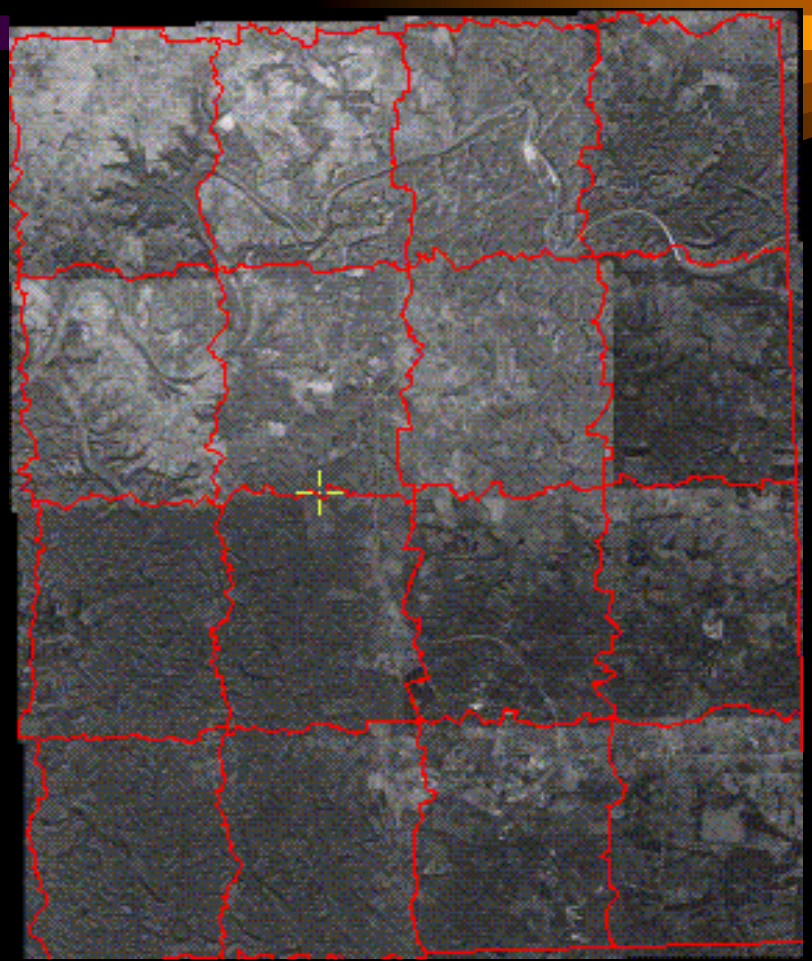
(Mosaicked Digital Ortho Quad)

- 7.5’ x 7.5’ Minute Format
- 1 Meter Resolution



Seam Lines Between DOQQ's

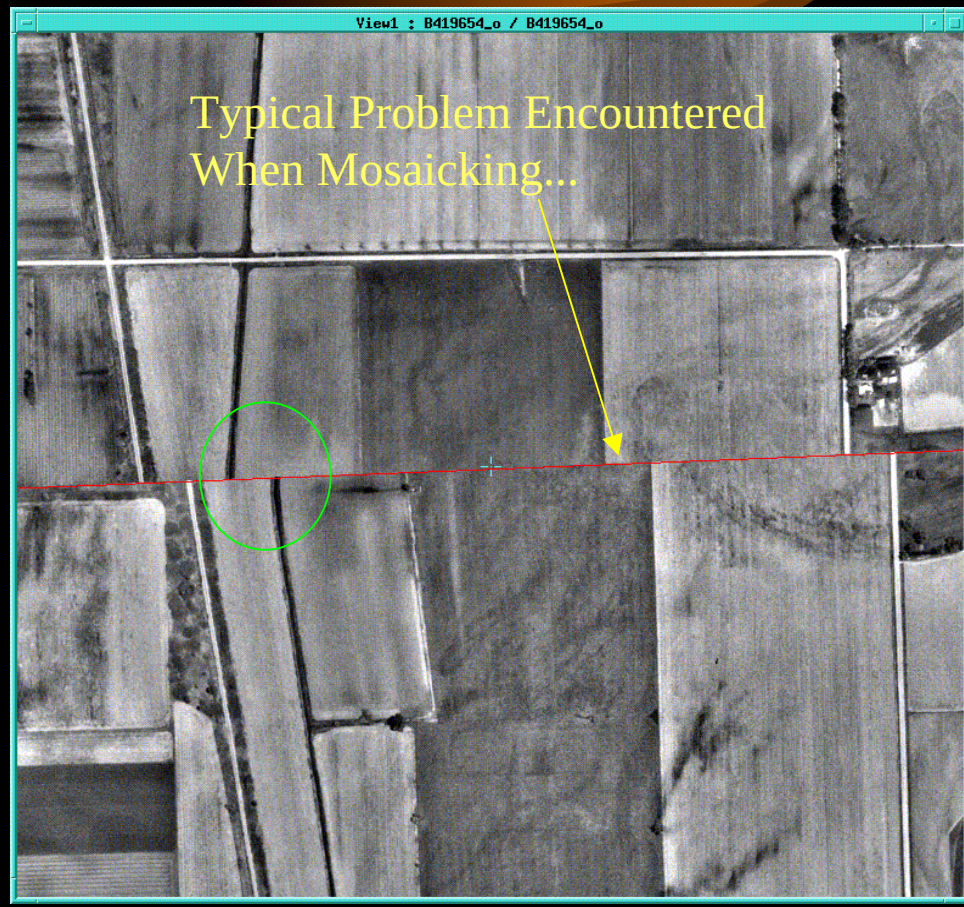
– Interactively Placed Within Overedge Of Adjacent DOQQs



Interactively placed Seam Lines Avoid Areas Of Offset

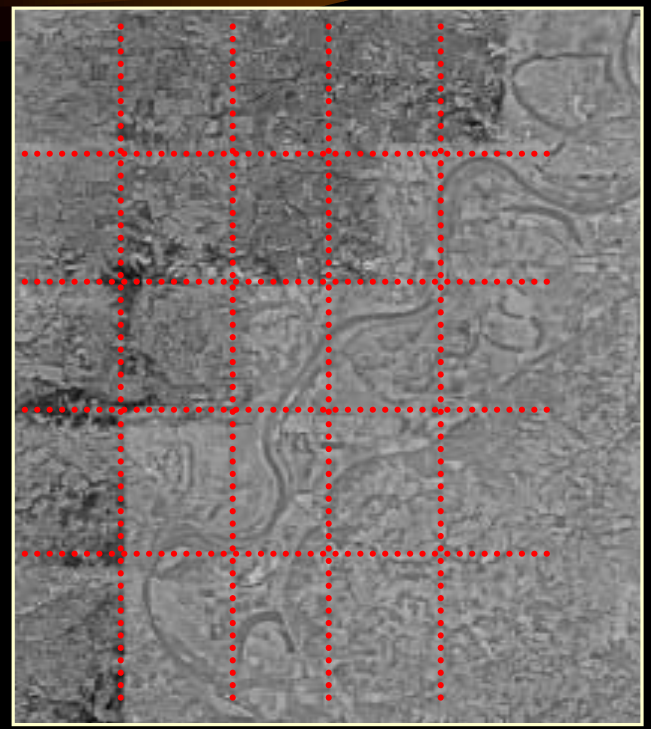
Due to differences in source photography and DOQQ production factors, the USGS DOQQ's can have up to 10 meters (31 feet) of displacement on the **X** and **Y** coordinates.

The mosaic cut line is interactively placed in areas where differences are minimal, and offset is reduced or eliminated.



Tone Adjustment

Radiometric (tone) Adjustment is a process where all image tiles for a given area (I.E. county) are gathered, and a *universal* tone is assigned throughout the area. This reduces the "checker board" type mosaic effect as can be seen in the example.



Example Of Checker board Mosaic

Naming Convention: There is a nationally recognized naming convention for the MDOQ tiles. It is as follows:

prefix latitude longitude block_grid> (**M3908933**)

Prefix Options

M: This is where all 16 DOQQ image files are available, and exist in the same *UTM zone*.

X: This is where some or all DOQQ image files DID NOT exist. This name can exist for both native UTM zone, and reprojected zone image tiles.

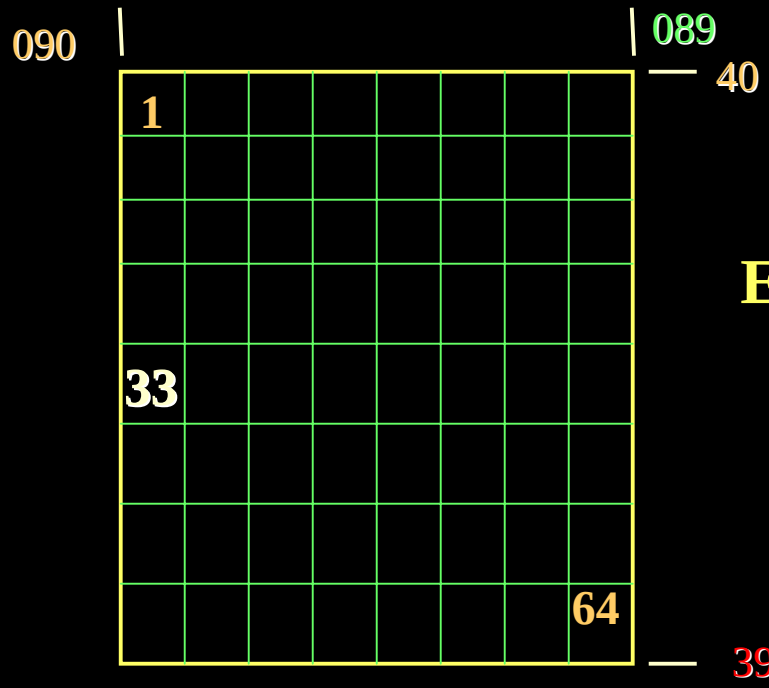
Z: This is where all 16 DOQQ image files are available, and may exist in a neighboring *reprojected UTM zone*.

Naming Convention: *continued ...*

Latitude: This is the **latitude** of the south-east corner. (39)

Longitude: This is the **longitude** of the south-east corner. (089)

Block Grid: This is the one-degree **block number**. (33)



Example of One Degree block for Image Tile:

M3908933

Image Compression Process:

Image mosaics are compressed with the following compression ratios:

Black and White: 20 to 1

CIR: 50 to 1

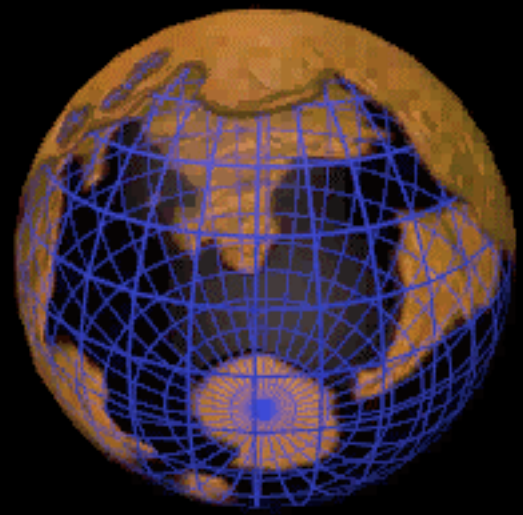
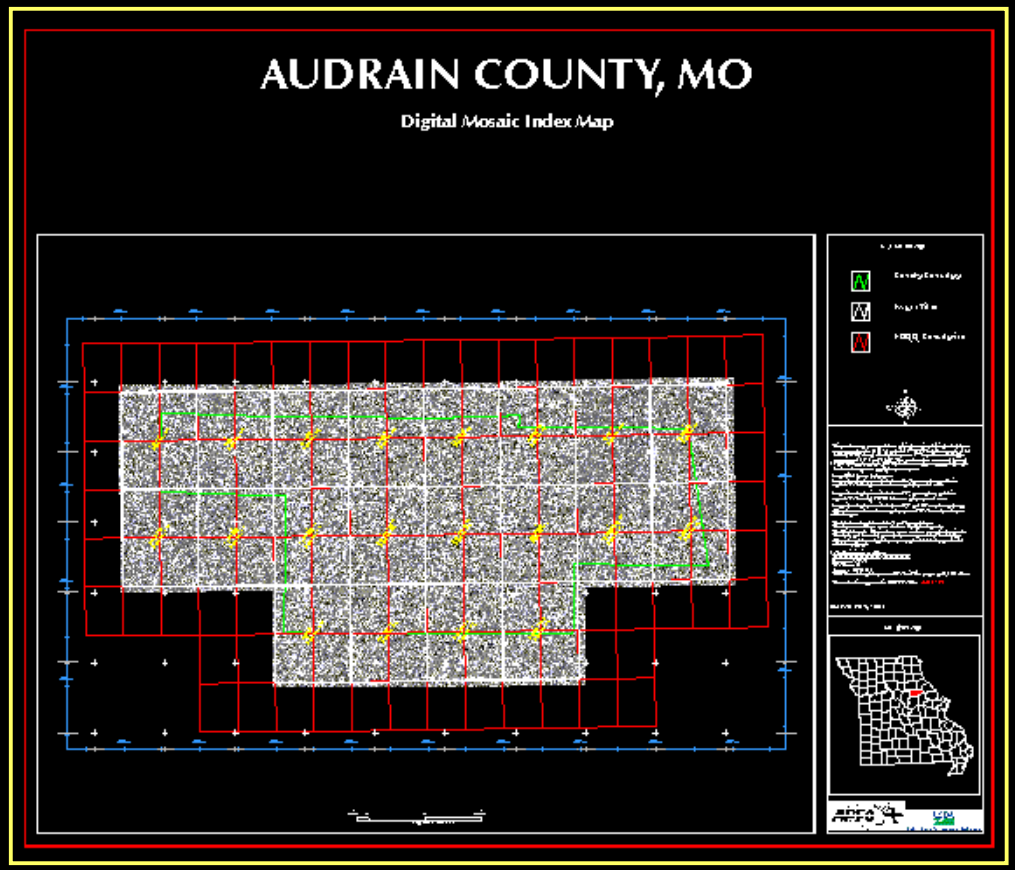
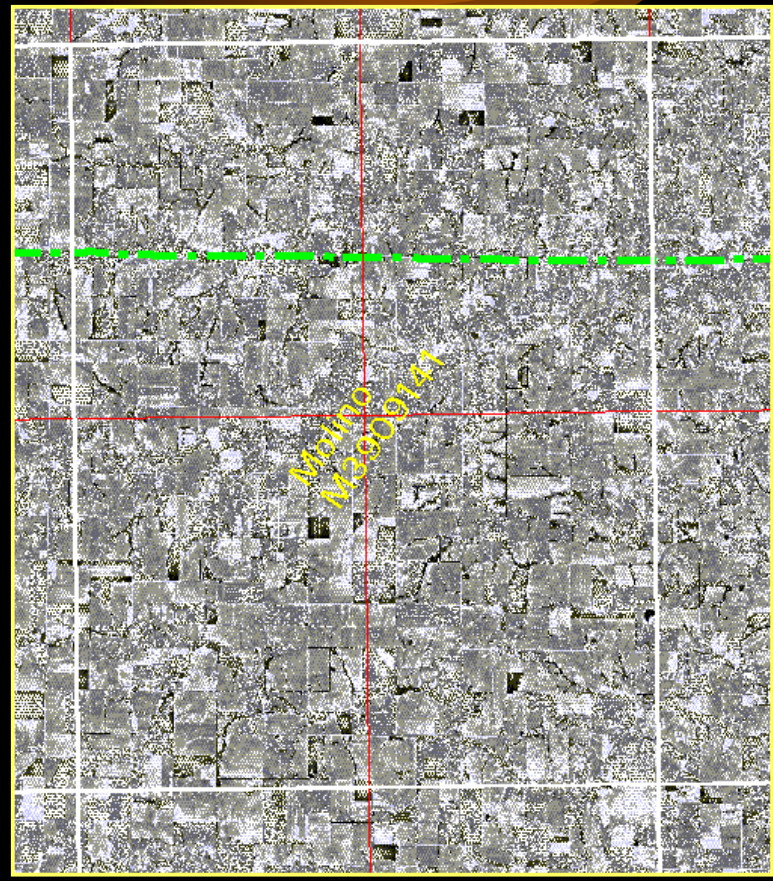


Image Plot Index



County Index: Full View



Zoom In Of Features

Common Land Unit (CLU)

Tabular Data

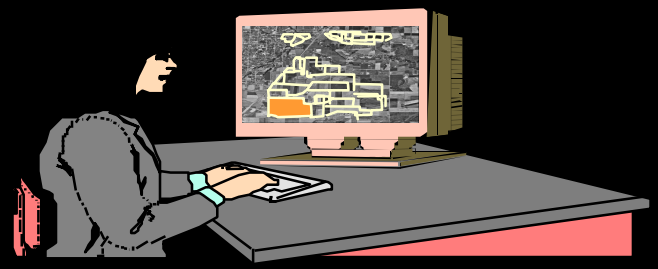
- Tract Number(s)
- Field Number(s)
- Acreage Total(s)
- Land Classification

CLU Attributes

Building the GIS Database

FSA Farm Records

Farm: 202
Tract: 1101
CLU: 2
Operator: J. Jones
Owner: J. Jones
2000 Land Cover: Ag
2000 Landuse: Corn
2000 Use Status: Planted
2000 Planting Date: 3/10/2000
2000 Reported Acres: 150
1999 Land Cover: Ag
1999 Landuse: Soybeans
1999 Use Status: Harvested
1999 Planting Date: 3/20/1999
1999 Reported Acres: 150
HEL/NHEL: HEL

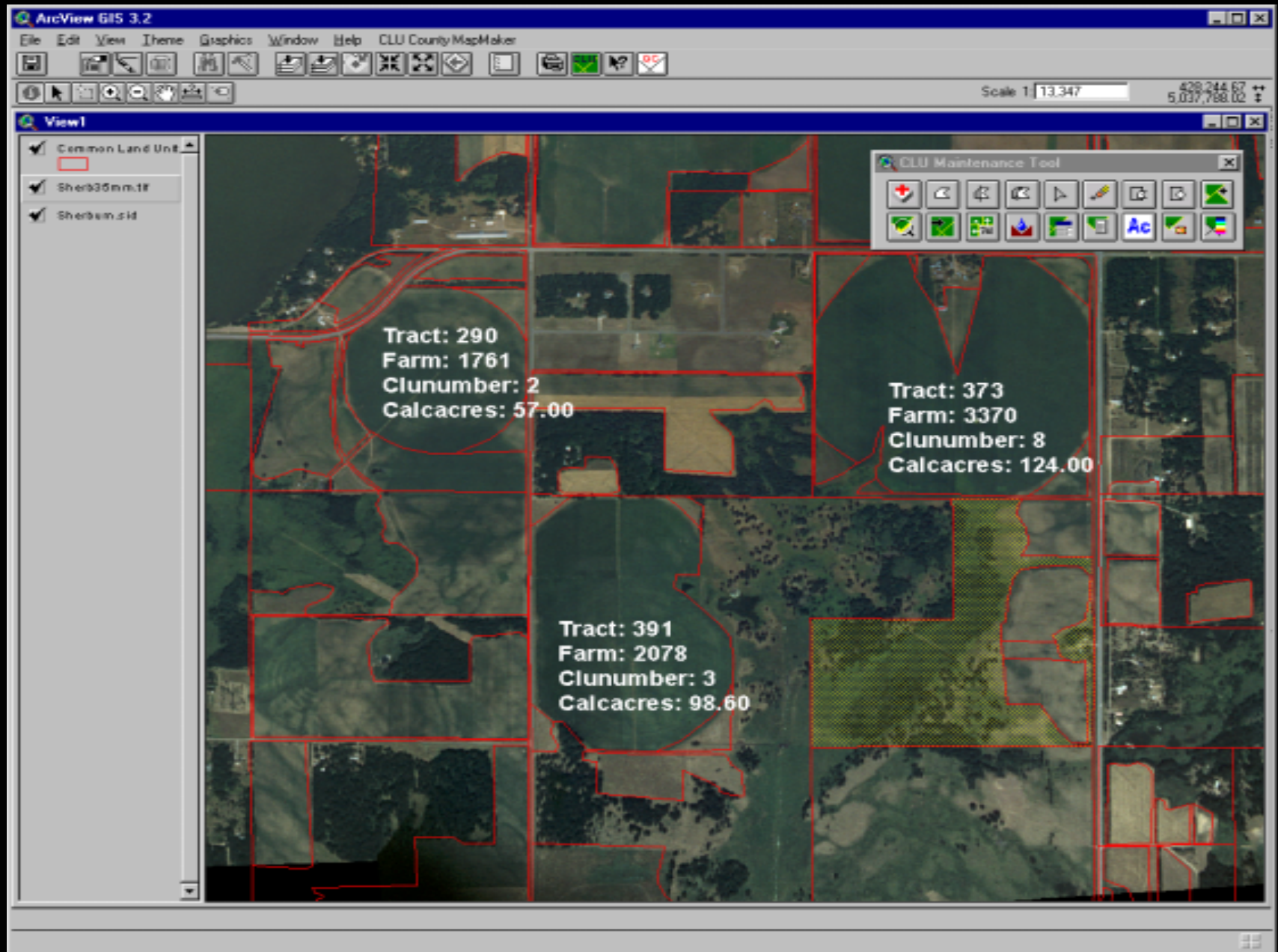


Service Center

FSA Field Boundaries

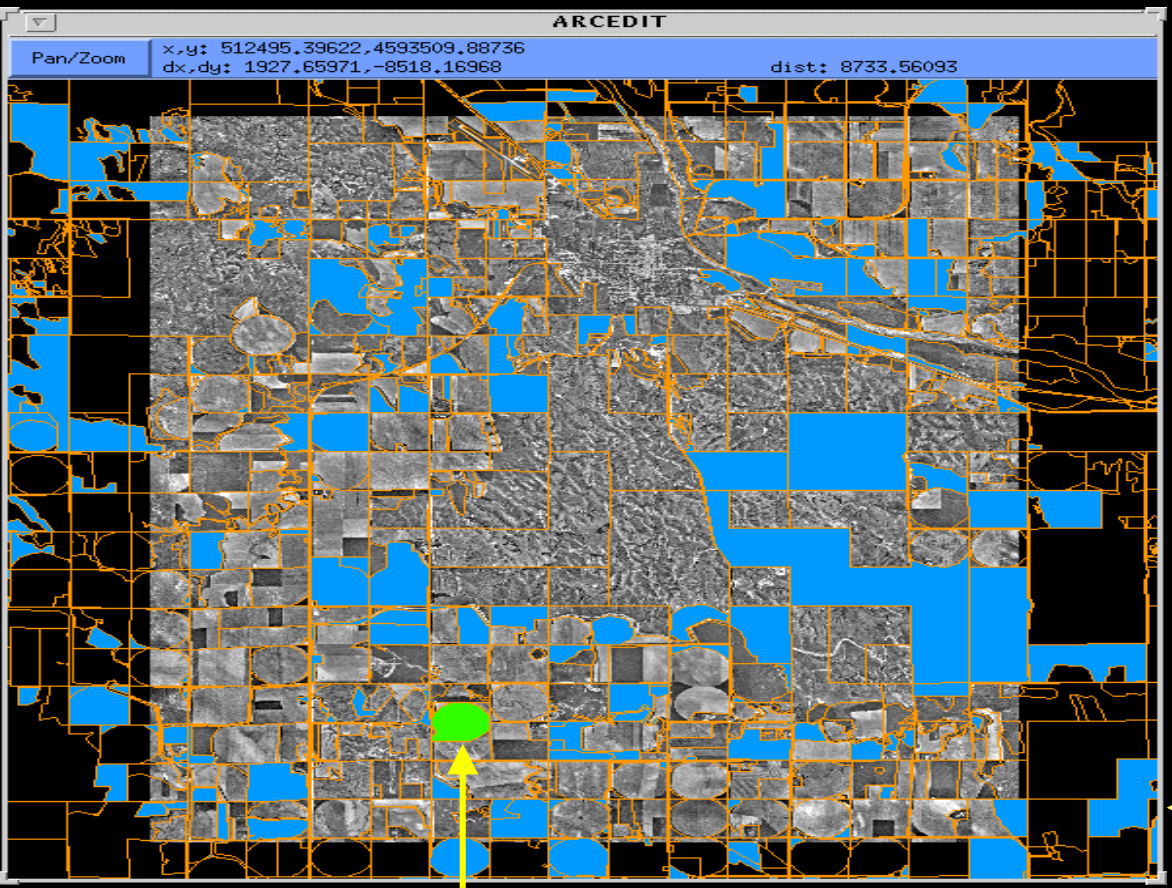
Digital Ortho-Image Base

Tools To Manage CLU Information in GIS



QA Inspection Steps Of The Common Land Unit (CLU)

Randomly Select Fields To Inspect.



Field Boundaries Are Randomly Selected To Ensure That Enough Inspections Are Completed To Discover Any Inaccurate Trends With A 90 Percent Confidence Level.

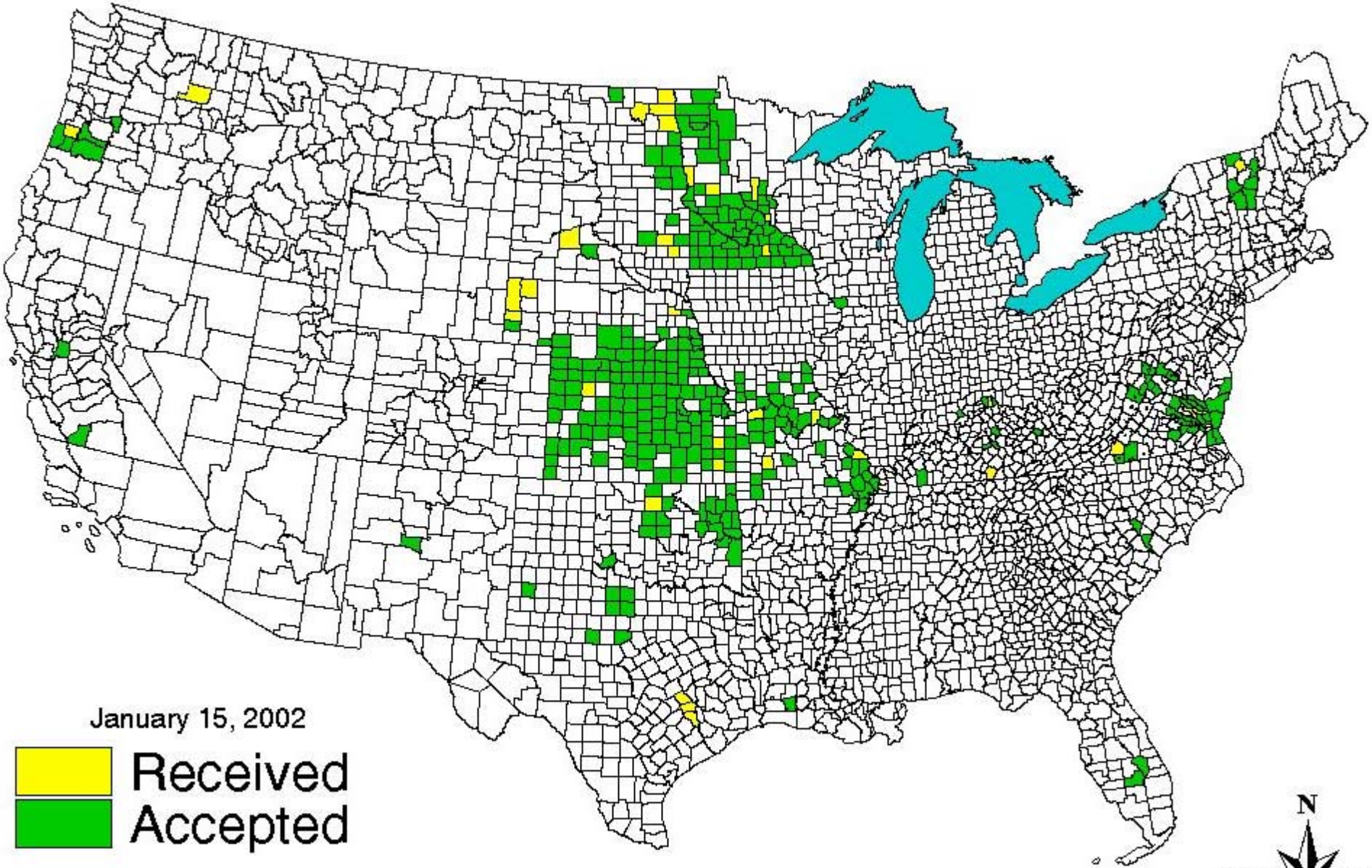
Blue Fills Are Random Selections

Green Fills Are Checked And Accepted

APFO

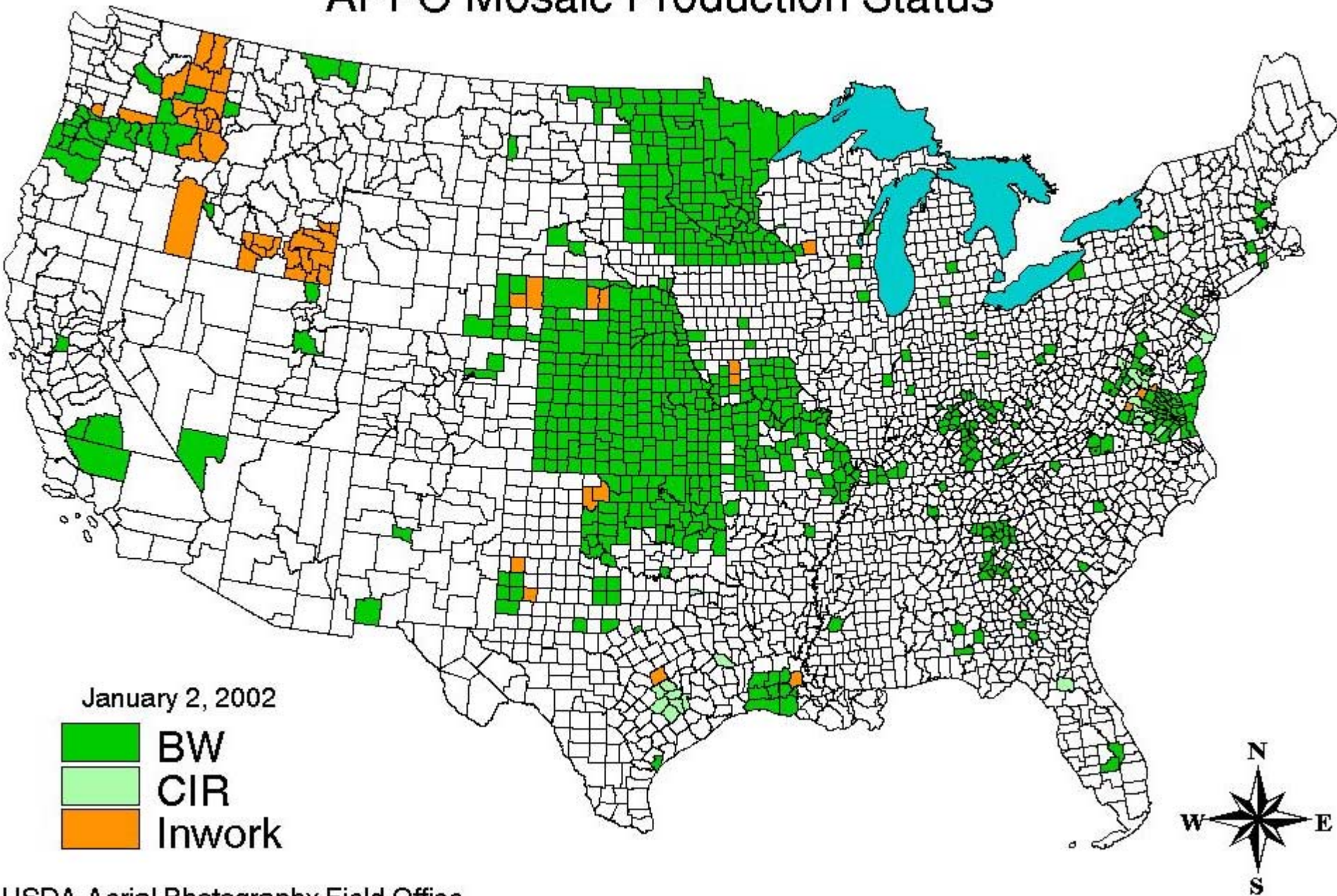
2222 West 2300 South Salt Lake City, UT 84119

APFO CLU Production Status



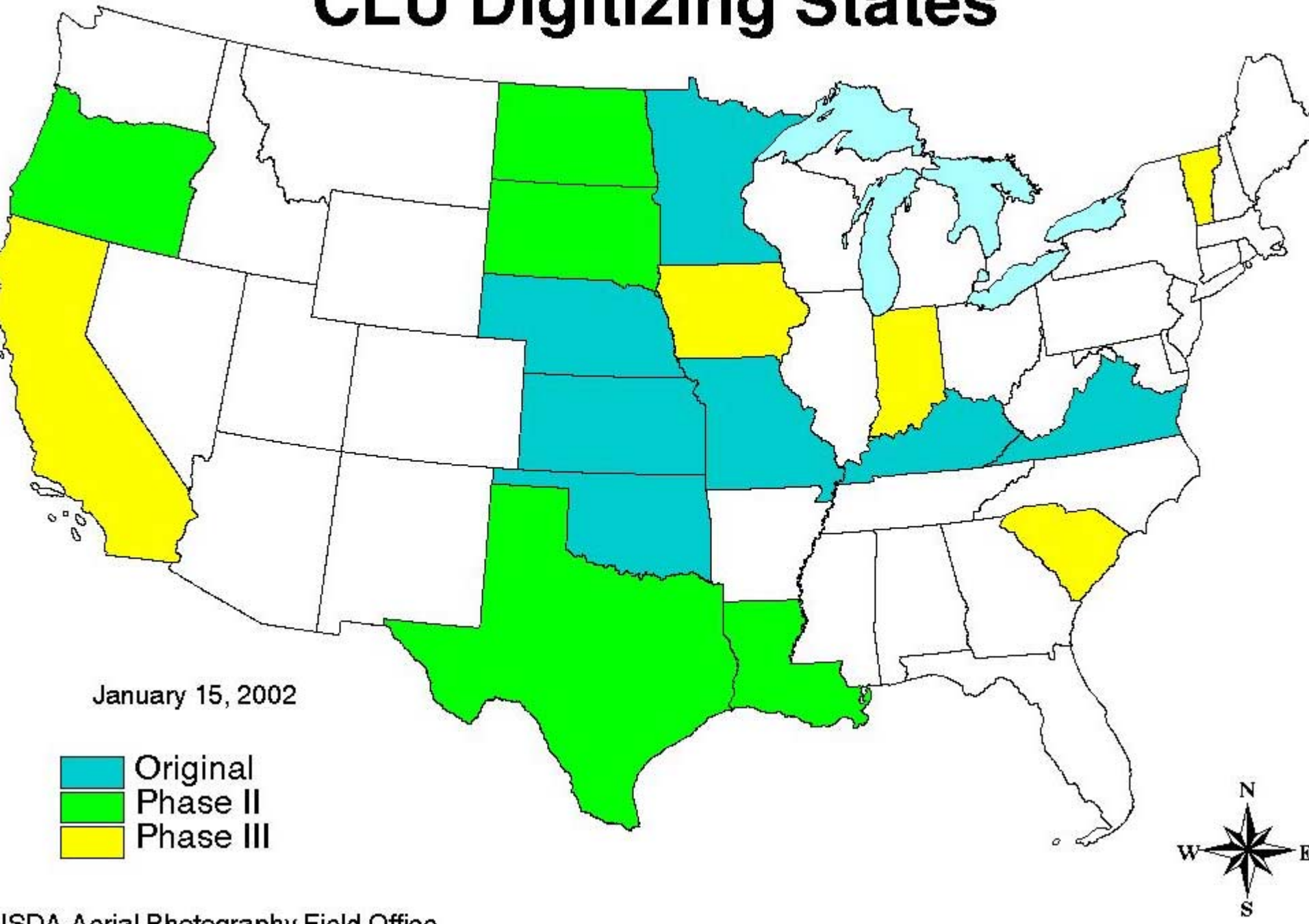
USDA-Aerial Photography Field Office

APFO Mosaic Production Status



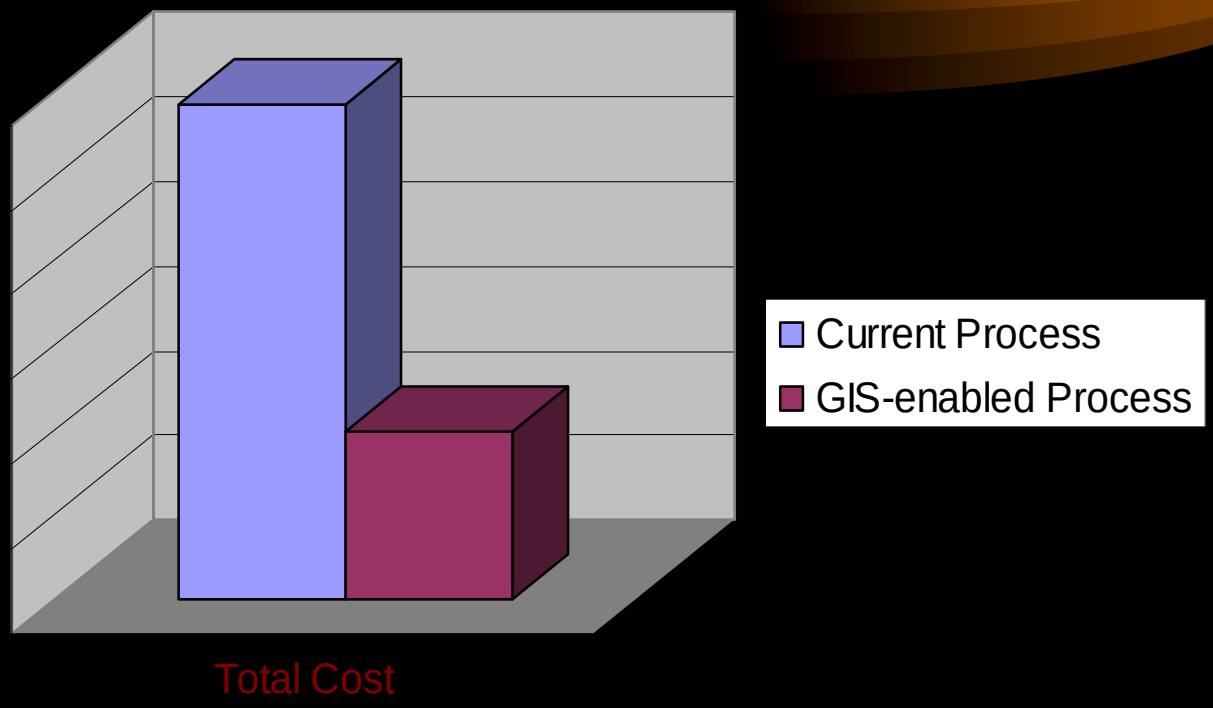
USDA-Aerial Photography Field Office

CLU Digitizing States



USDA Aerial Photography Field Office

GIS Cost/Benefit



Estimated $77 Million Annual Savings From GIS.

Source: *FSA GIS Business Case*, 1996. **DOES NOT INCLUDE FARM CREDIT PROGRAMS.**

End Of Presentation !