

Development of Web-based Farm Mapping Tool for Tennessee

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Forbes Walker and Alan Jolly

Biosystems Engineering and SOIL SCIENCE

Nutrient Management Planning

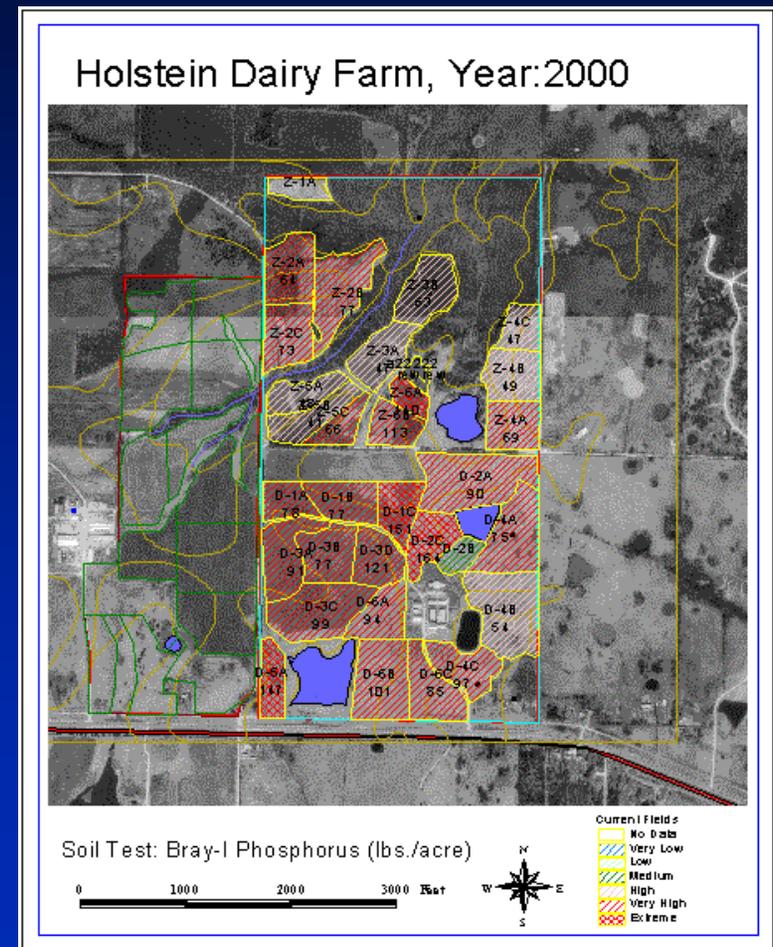
- Federal and state regulations require animal producers to develop and use the nutrient management plans (NMP)
- Accurate maps are critical component of NMPs
- Current mapping software is expensive and requires GIS skills
- University of Tennessee Extension is developing an Internet-based Farm Mapping Tool for use in NMPs in Tennessee

Tennessee Spatial Nutrient Management Planning Project

- May 2004 to present (funded through Tennessee Department of Agriculture)
- The modify and adapt spatial nutrient management planning (SNMP) tool developed by the University of Missouri using ArcIMS
- Develop a website to share GIS data with agricultural professionals and producers in Tennessee
- Train agricultural extension agents and district conservationists in the application the tool for developing maps for use in the development of NMPs

Spatial Nutrient Management Planner

- An Example Map Generated from the Spatial Nutrient Management Planner (SNMP) Tool developed by the University of Missouri (<http://www.cares.missouri.edu/SNMP/about.html>).



Spatial Nutrient Management Planner

- Accurate farm and field maps
- Identification of sensitive sites on a farm that have to be more carefully managed to protect environmental quality
- An accurate assessment of the area of each field and the area of each field that manure or litter can be land-applied

Desired Functionality of Tennessee Nutrient Management Planner

- Display Digital Ortho Quarter Quads, and Digital Raster Graphics (Digital Topo's)
- Display SSURGO soil data (if available)
- Create and assign attribute information to polygons defining farm and fields (traced using DOQ layer)
- Enter Soil Test data for fields

Desired Functionality of Tennessee Nutrient Management Planner

- Create and buffer features (point, line, polygon) for setbacks
 - Available setback features and associated buffer distances should be pre-defined from server side
- Perform a variety spatial and database queries returning:
 - field size, setback area acres, spreadable acres, % and type of Soils (if available) within a field among others
- Export data into format that can imported into the NRCS MMP Tool
- Create Maps: Base, Topographic, Soils Manure application, Setback, etc.

NMP Map Types

Farmstead sketch.

Local proximity map (using Topo background).

Aerial maps of land application area.

Individual field maps with marked set backs, buffers, and waterways, and environmentally sensitive areas, such as sinkholes, wells, gullies, tile inlets, etc.

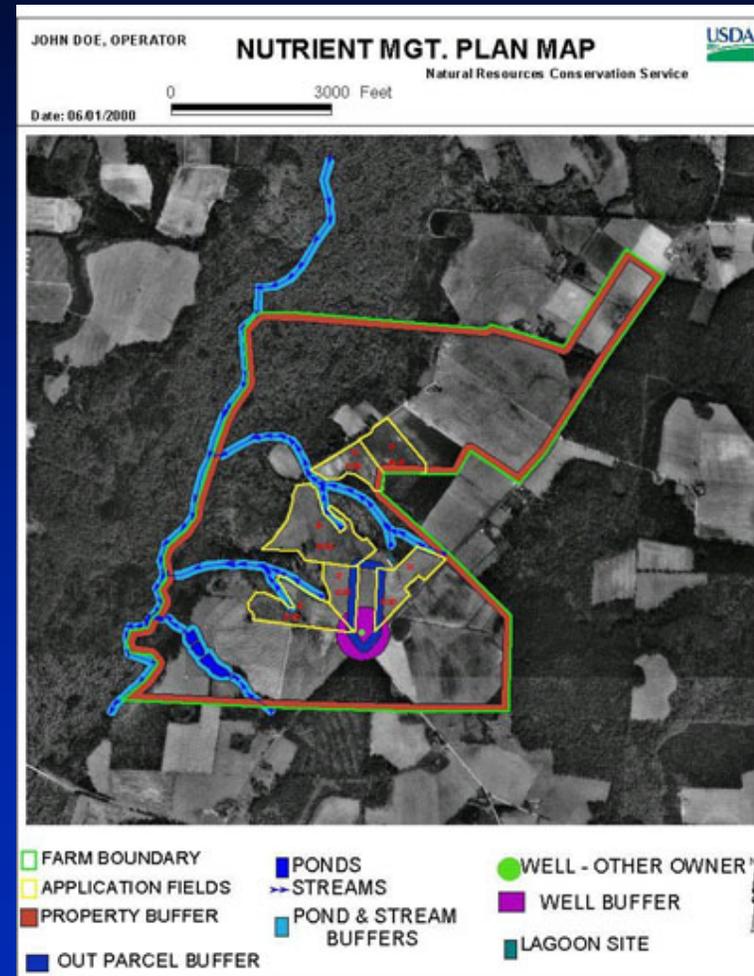
Soil map, with appropriate interpretations

NMP Maps

- Farm property lines
- Land use -- cropland, pasture, forest, etc.
- Farm field boundaries with field identification
- Surface water locations, including streams, rivers, ponds, ditches and wetlands
- Arrows showing the direction of stream or river water flow
- Well locations

NRCS Maps

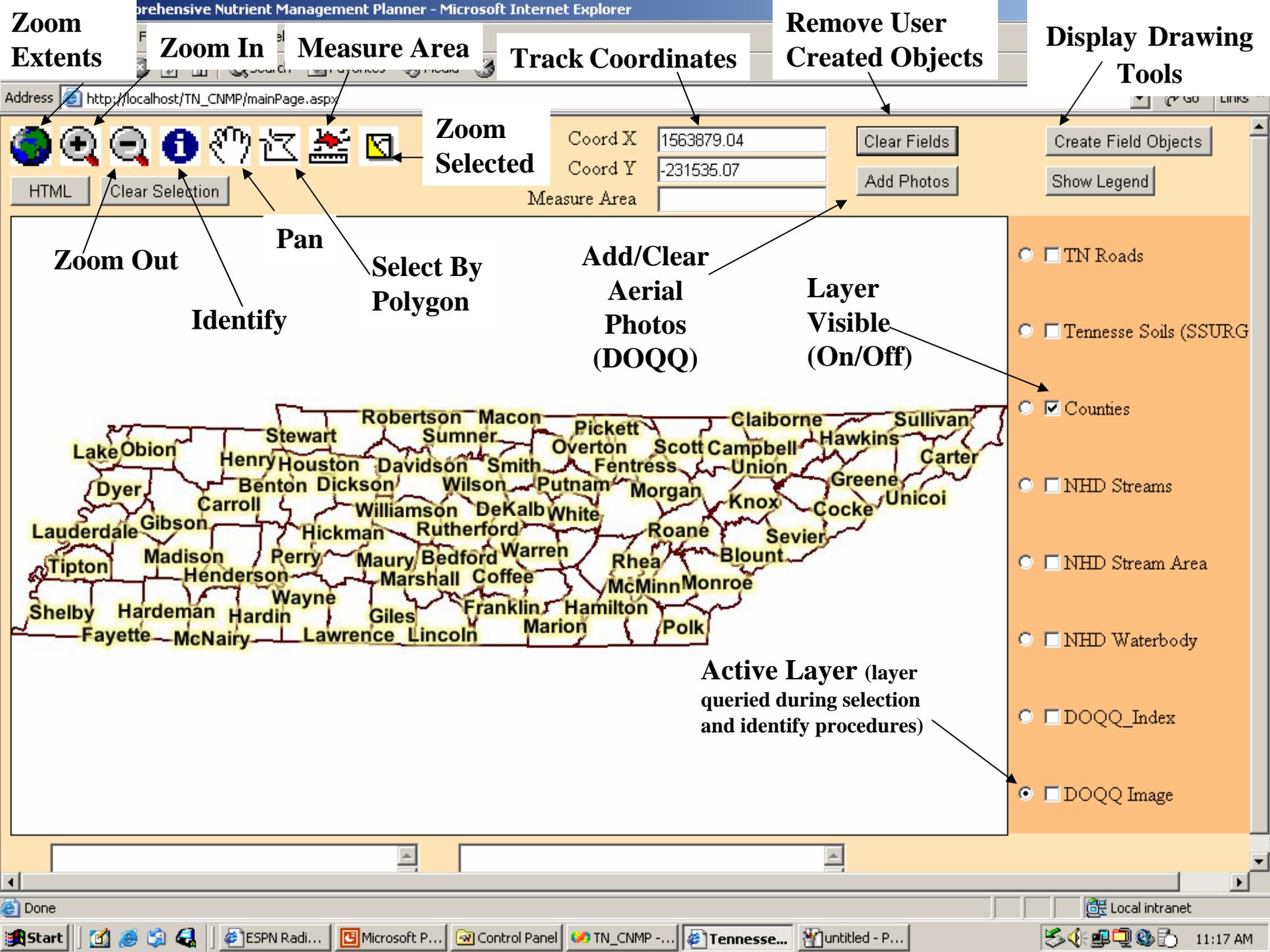
- Buffers around sensitive areas
- Residences or public gathering areas
- North arrow
- Date prepared, by who
- Road names or numbers
- Name of county
- Legend with map symbols
- Bar Scale on the map



Considerations

- Privacy Considerations
 - How should client delineated objects and soil data be handled
 - Currently no client generated data is 'saved' on the server
 - FSA currently delineates fields for growers and sends them maps for approval – modifying the Nutrient Management Website could allow farmer to delineate their own fields or enter information (renting/leasing etc.)
- 'Thin' Web interface – many clients may not have high speed connections

gis.ag.utk.edu/tncnmp



Zoom Extents

Zoom In

Measure Area

Track Coordinates

Remove User Created Objects

Display Drawing Tools



Zoom Selected

Coord X	1563879.04
Coord Y	-231535.07
Measure Area	

Clear Fields

Add Photos

Create Field Objects

Show Legend

HTML Clear Selection

Zoom Out

Identify

Pan

Select By Polygon

Add/Clear Aerial Photos (DOQQ)

Layer Visible (On/Off)



Active Layer (layer queried during selection and identify procedures)

- TN Roads
- Tennessee Soils (SSURG)
- Counties
- NHD Streams
- NHD Stream Area
- NHD Waterbody
- DOQQ_Index
- DOQQ Image

Coord X:
 Coord Y:
 Measure Area:

Zoom In tool Active

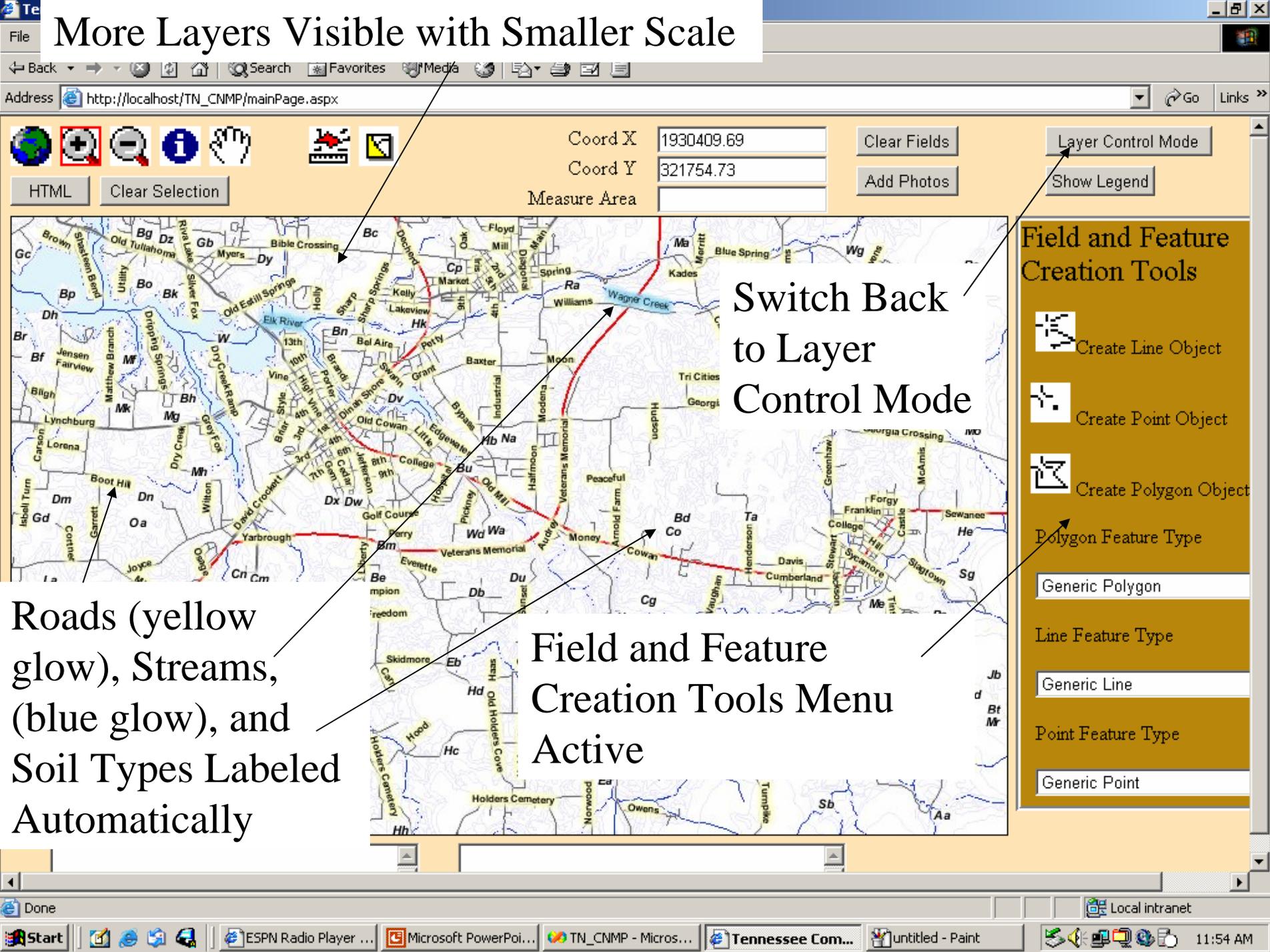


Zoom in Drag Box (defines area to zoom to)

Layer visibility based on scale

- TN Roads
- Tennessee Soils (SSURG)
- Counties
- NHD Streams
- NHD Stream Area
- NHD Waterbody
- DOQQ_Index
- DOQQ Image

More Layers Visible with Smaller Scale



Coord X 1930409.69
Coord Y 321754.73
Measure Area

Clear Fields
Add Photos

Layer Control Mode
Show Legend

Switch Back to Layer Control Mode

- Field and Feature Creation Tools
- Create Line Object
 - Create Point Object
 - Create Polygon Object
 - Polygon Feature Type
 - Generic Polygon
 - Line Feature Type
 - Generic Line
 - Point Feature Type
 - Generic Point

Roads (yellow glow), Streams, (blue glow), and Soil Types Labeled Automatically

Field and Feature Creation Tools Menu Active

Add Aerial Photos (DOQQ)

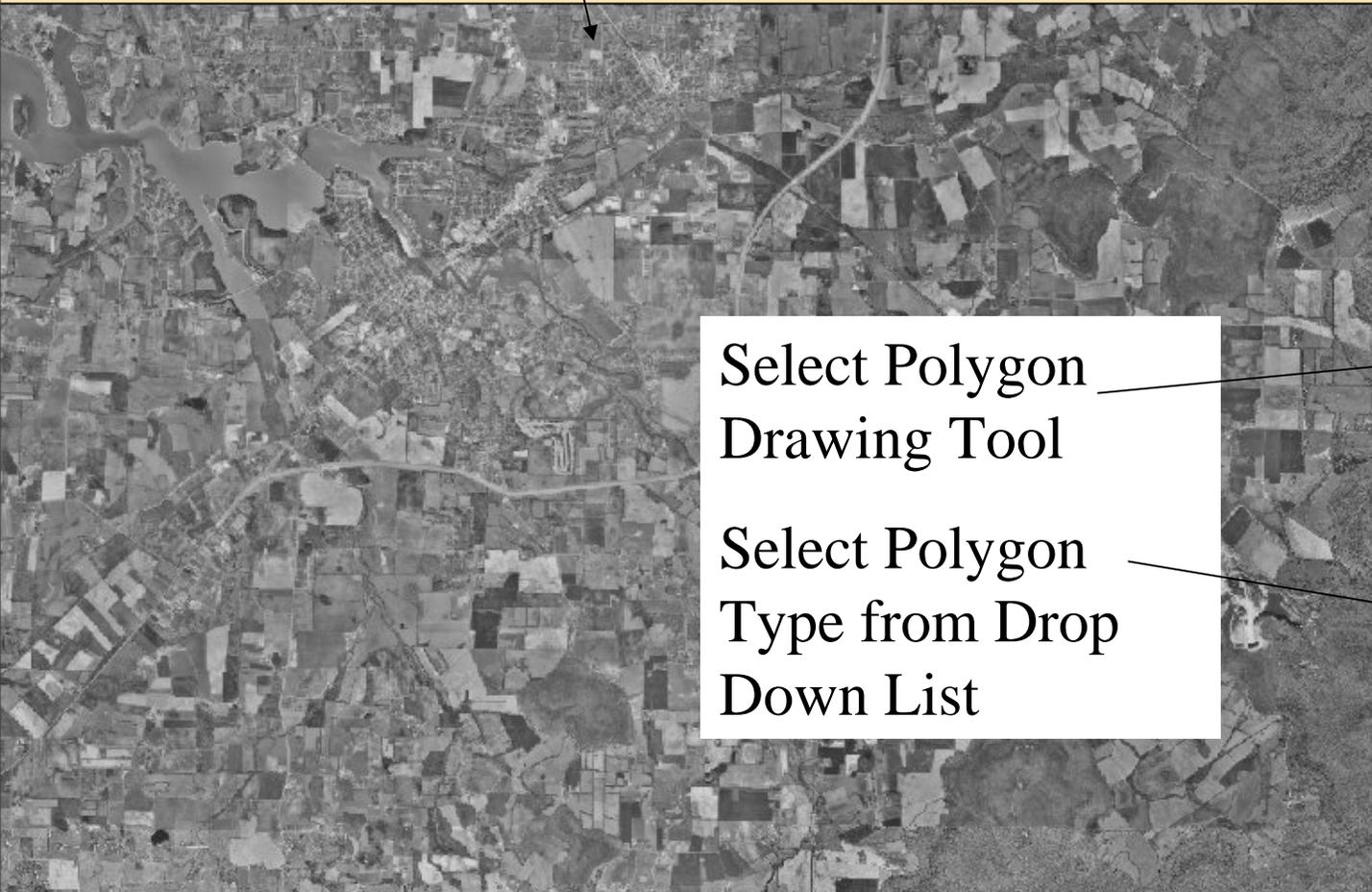
Clear Aerial Photos



Coord X

Coord Y

Measure Area



Select Polygon Drawing Tool

Select Polygon Type from Drop Down List

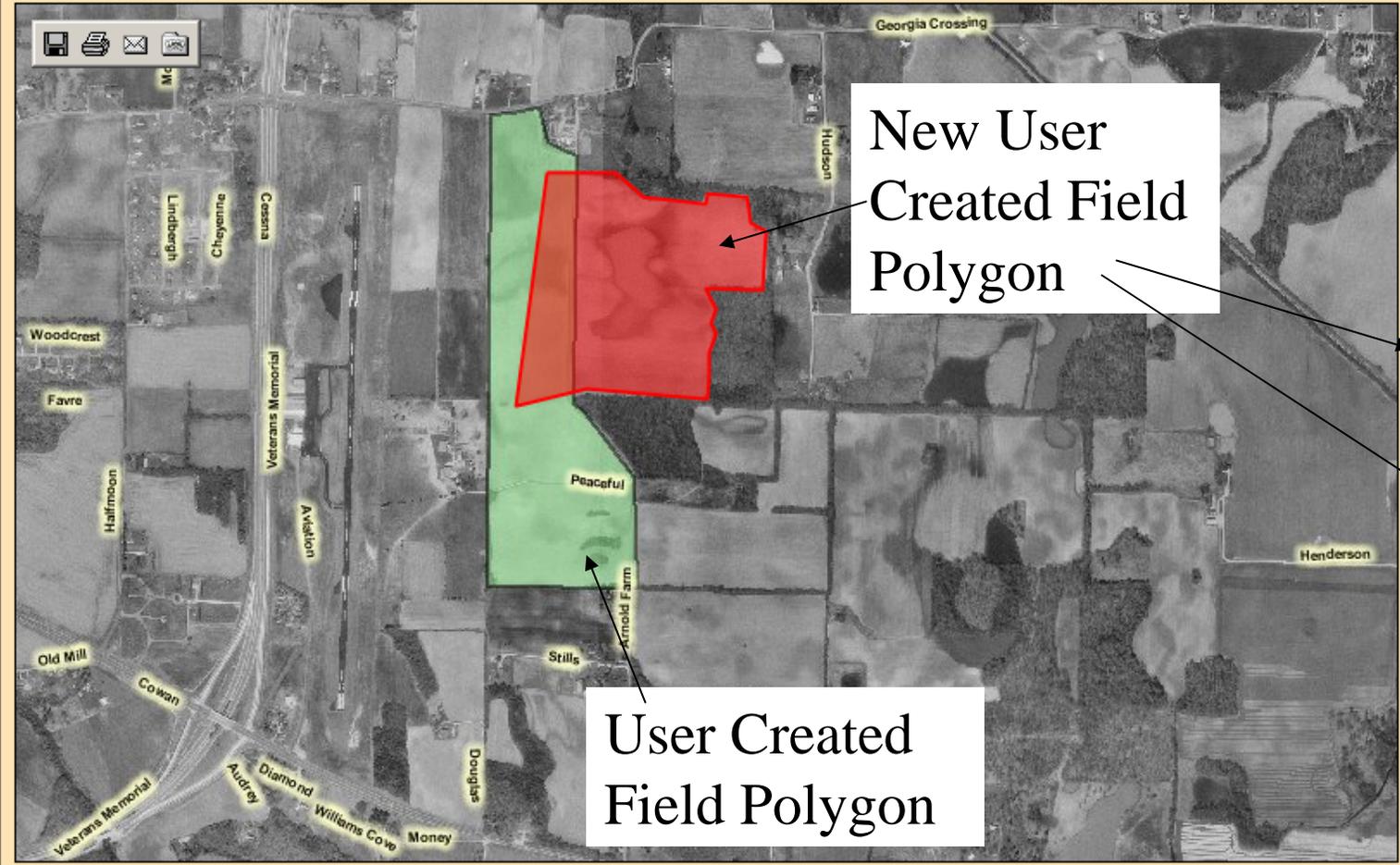
Field and Feature Creation Tools

- Create Line Object
- Create Point Object
- Create Polygon Object

Polygon Feature Type

- Generic Polygon
- Generic Polygon
- Field Boundary
- Farm Boundary**
- Dwelling(non - owned)
- Drinking water lake (non-vegetative)
- Drinking water lake (vegetative buffer)
- Other lake (non-vegetative buffer)
- Other lake (vegetative buffer)
- Slope Restriction
- Generic Polygon
- Field Boundary

Coord X: Clear Fields
 Coord Y: Clear Photos
 Measure Area:
 HTML Clear Selection Layer Control Mode Show Legend



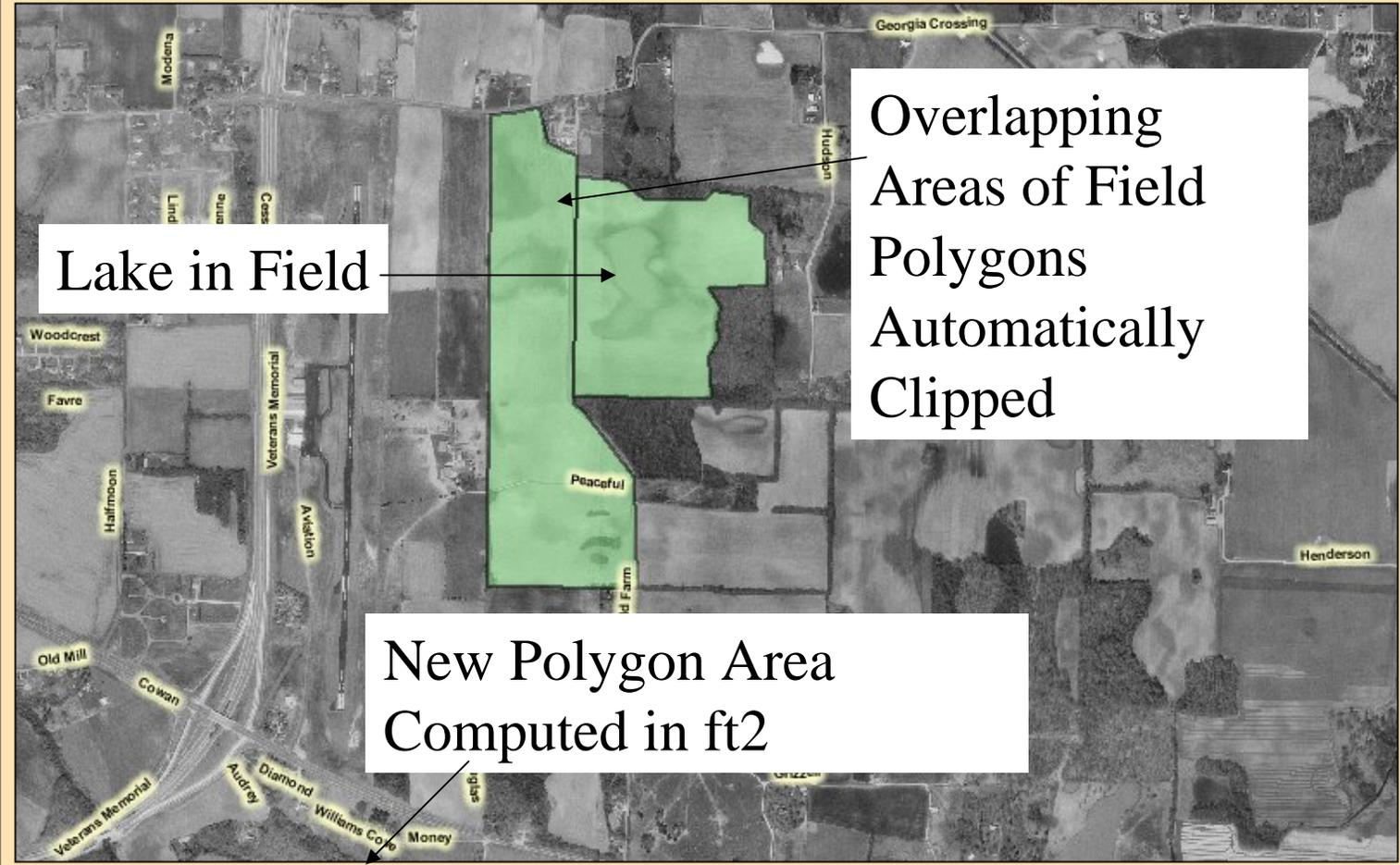
New User
Created Field
Polygon

User Created
Field Polygon

Field and Feature Creation Tools

- Create Line Object
- Create Point Object
- Create Polygon Object
 - Polygon Feature Type
 - Field Boundary
 - Line Feature Type
 - Generic Line
 - Point Feature Type
 - Generic Point

Coord X: Clear Fields
 Coord Y: Clear Photos
 Measure Area: Layer Control Mode
 HTML Clear Selection Show Legend



Field and Feature Creation Tools

- Create Line Object
- Create Point Object
- Create Polygon Object

Polygon Feature Type

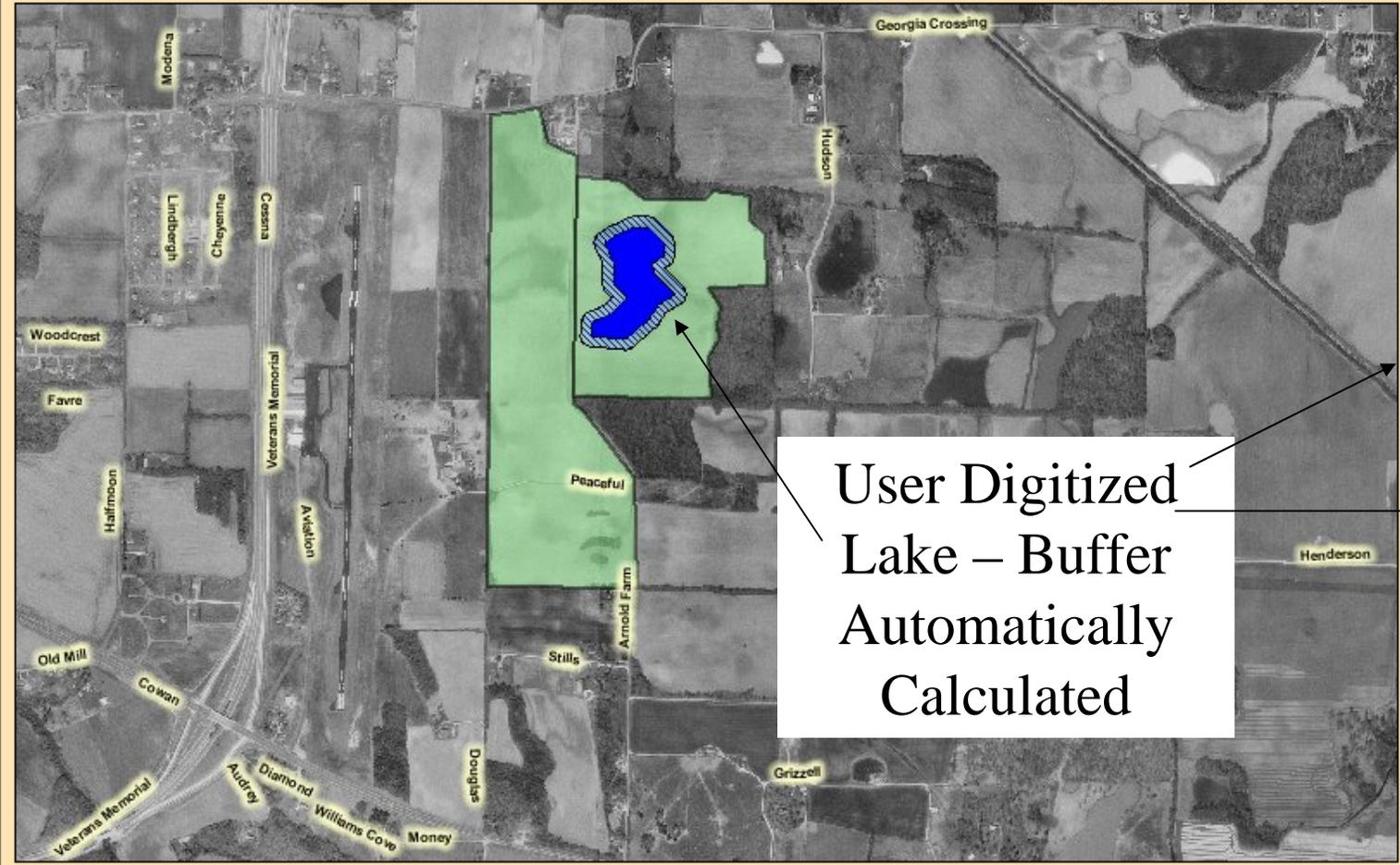
Line Feature Type

Point Feature Type

Polygon Area Farm Name

Coord X: 1949533.73 Clear Fields Layer Control Mode
Coord Y: 303482.54 Clear Photos Show Legend
Measure Area: []

HTML Clear Selection



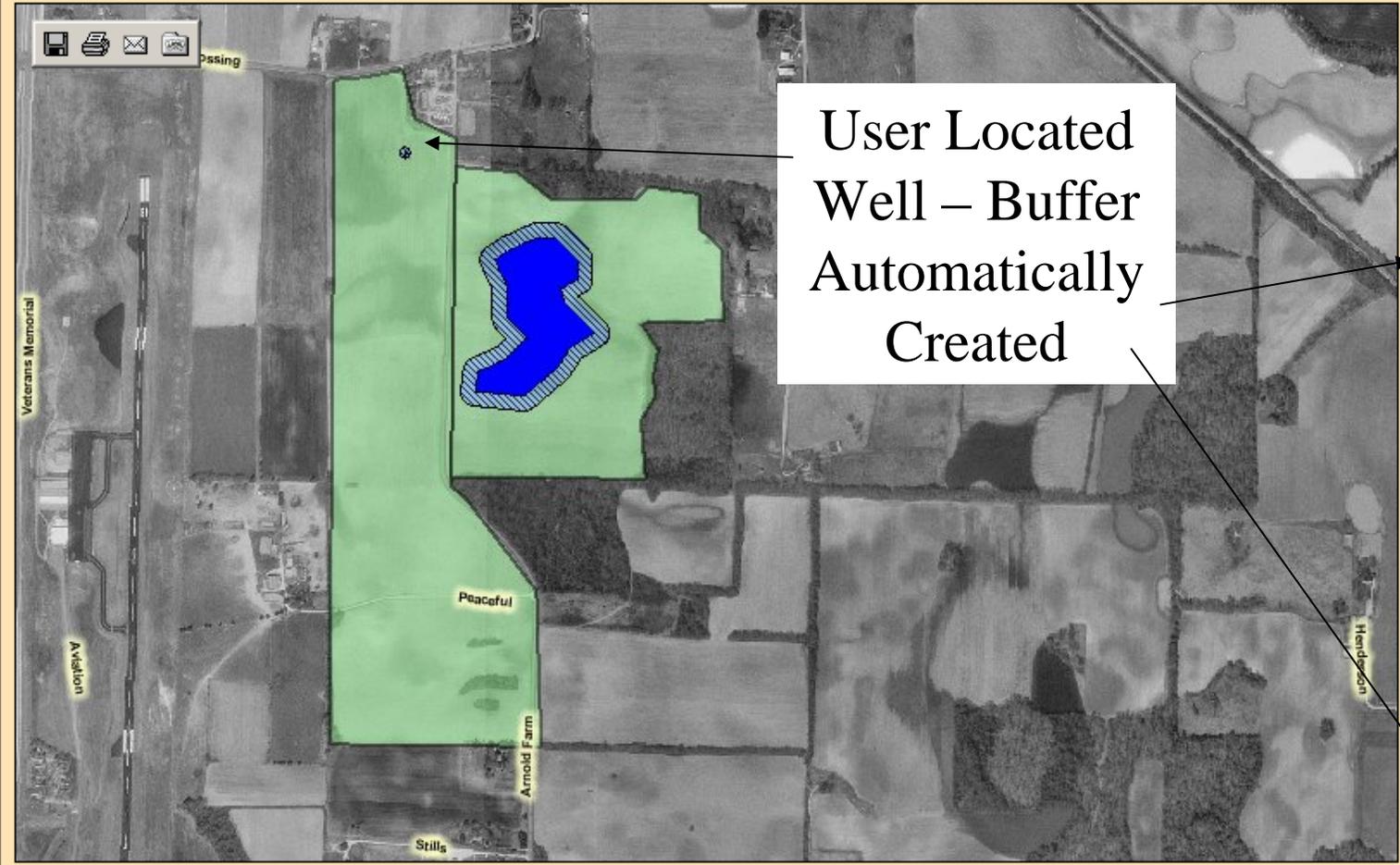
User Digitized
Lake – Buffer
Automatically
Calculated

Field and Feature Creation Tools

- Create Line Object
- Create Point Object
- Create Polygon Object
- Polygon Feature Type
 - Drinking water lake (non-vegetated)
 - Line Feature Type
 - Generic Line
 - Point Feature Type
 - Generic Point

Polygon Area 2953315.20207787 m2

Coord X: 1950544.16
Clear Fields
Layer Control Mode
Coord Y: 310002.34
Clear Photos
Show Legend
Measure Area



User Located Well - Buffer Automatically Created

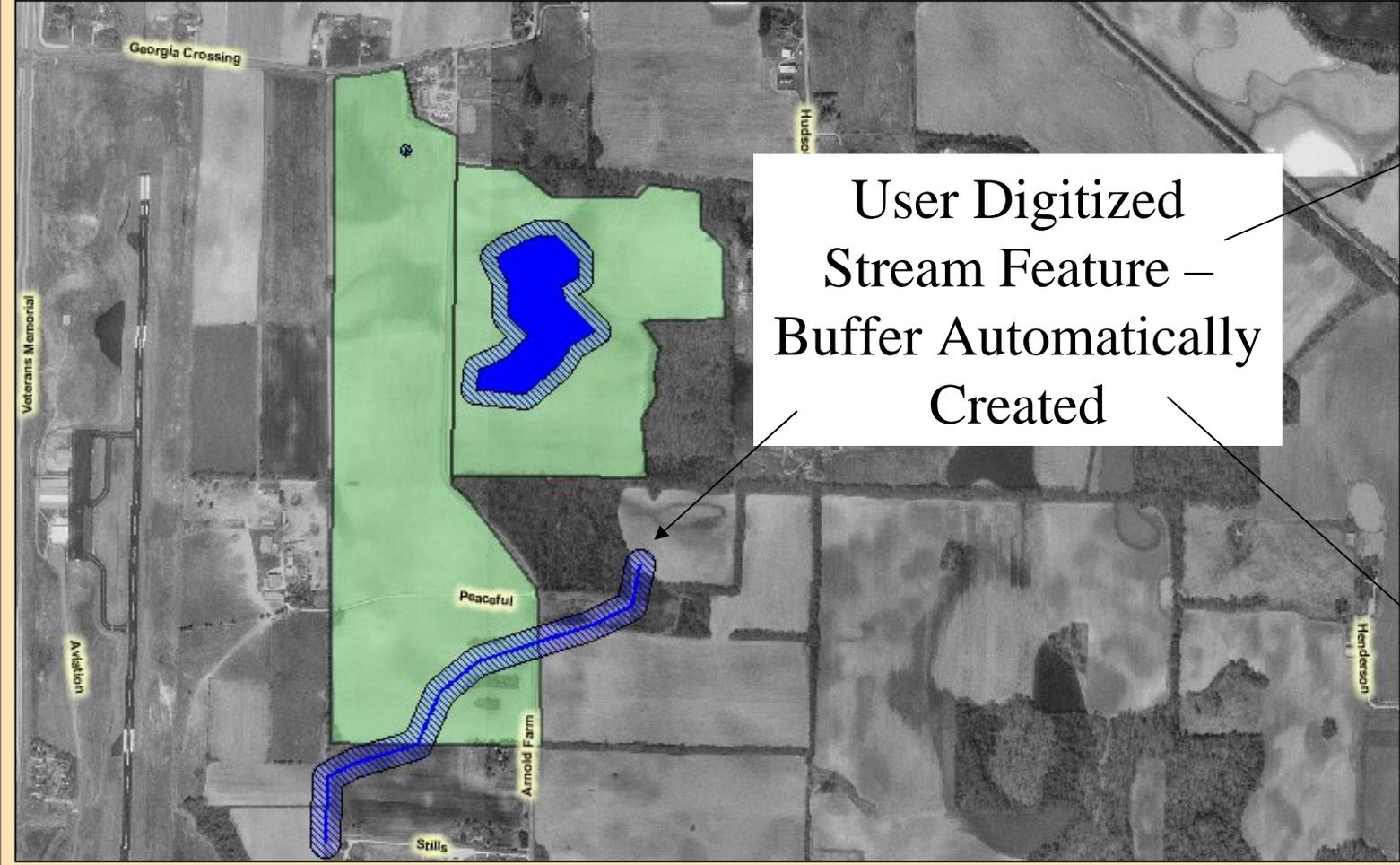
Field and Feature Creation Tools

- Create Line Object
- Create Point Object
- Create Polygon Object
- Polygon Feature Type
 - Drinking water lake (non-vegetated)
 - Line Feature Type
 - Generic Line
 - Point Feature Type
 - Drinking water well or intake

HTML Clear Selection

Coord X 1953235.83 Clear Fields
Coord Y 305199.11 Clear Photos
Measure Area

Layer Control Mode
Show Legend



User Digitized
Stream Feature –
Buffer Automatically
Created

Field and Feature Creation Tools

- Create Line Object
- Create Point Object
- Create Polygon Object

Polygon Feature Type

Drinking water lake (non-w...)

Line Feature Type

Stream (non-vegetative bu...)

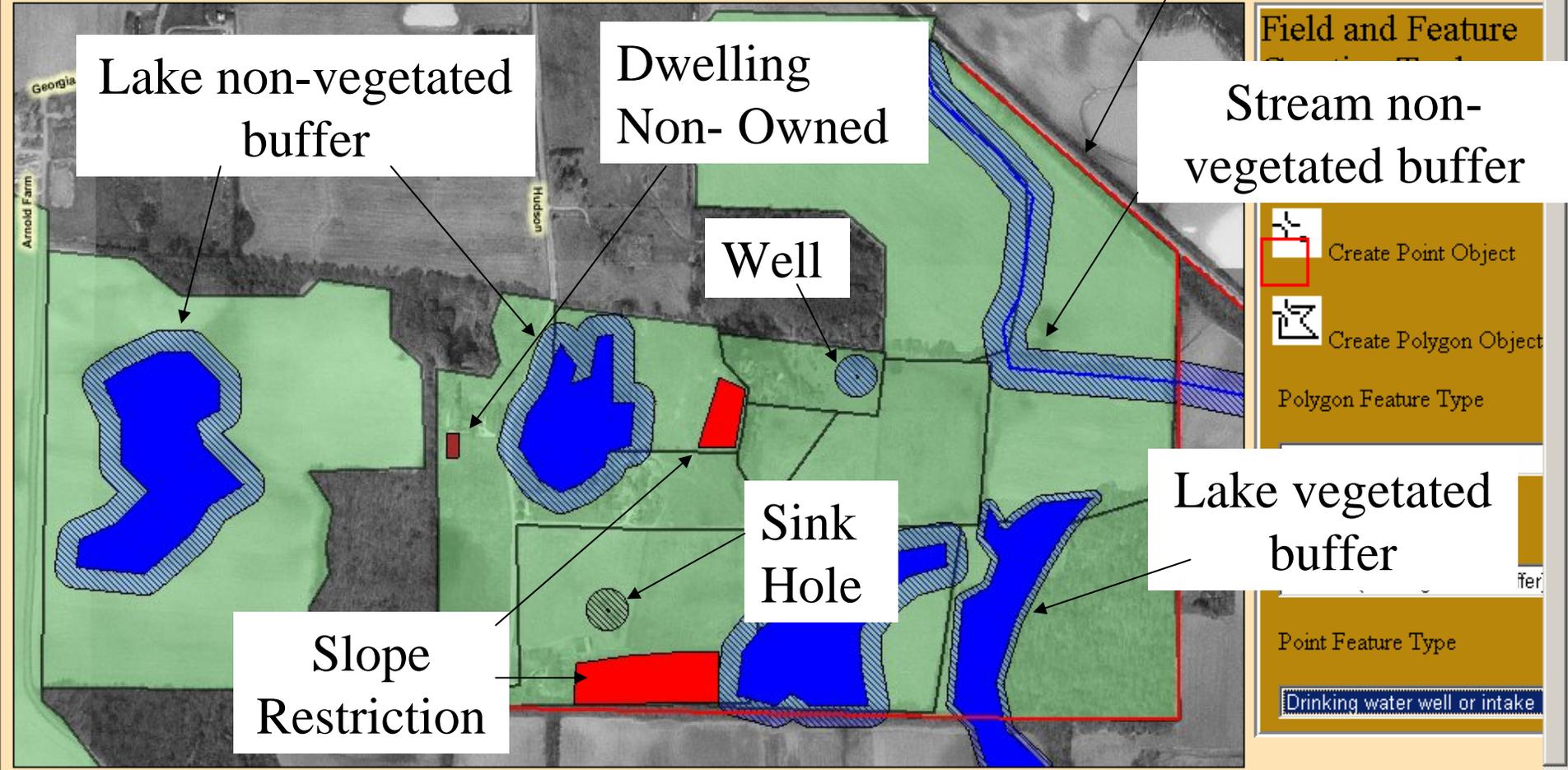
Point Feature Type

Drinking water well or inta...

HTML Clear Selection

Coord X: 1952986.74
 Coord Y: 307425.47
 Measure Area:

Clear Fields Clear Photos Layer Control Mode Show Legend



Field and Feature

Stream non-vegetated buffer

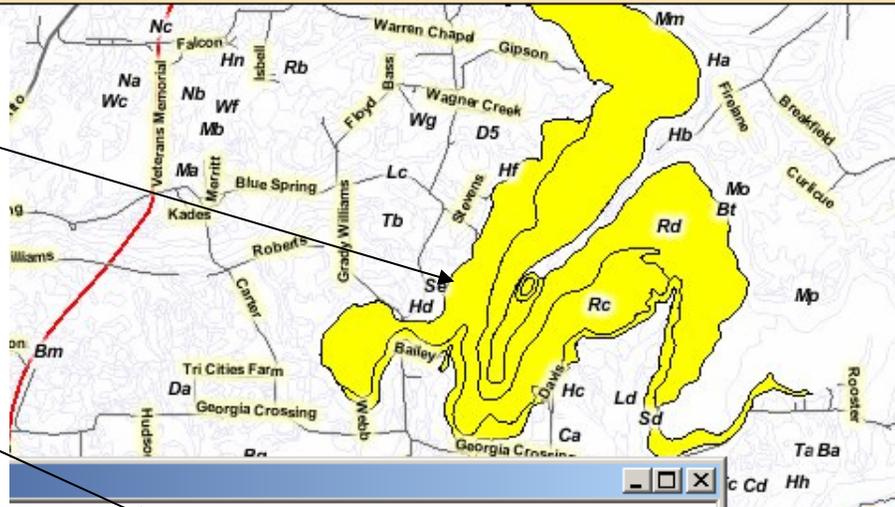
Create Point Object
 Create Polygon Object
 Polygon Feature Type
 Point Feature Type
 Drinking water well or intake

Coord X

Coord Y

Measure Area

Select Features are highlighted and Table of Selected Features and the associated attribute info is generated



- TN Roads
- Tennessee Soils (SSURG)
- Counties
- NHD Streams
- NHD Stream Area
- NHD Waterbody
- DOQQ_Index
- DOQQ Image

AREASYMBOL	SPATIALVER	MUSYM	MUKEY	SHAPE AREA	SHAPE LEN	OBJECTID	#ID#
	0	Rd	527252	0	0	0	172945
	0	Rc	527251	0	0	0	173870
	0	Bt	527154	0	0	0	174876
	0	Rc	527251	0	0	0	174878
	0	Sd	527257	0	0	0	174902
	0	Re	527253	0	0	0	174919
	0	Ga	527201	0	0	0	175354



TML Clear Selection

Zoom Selected

Coord X
Coord Y
Measure Area

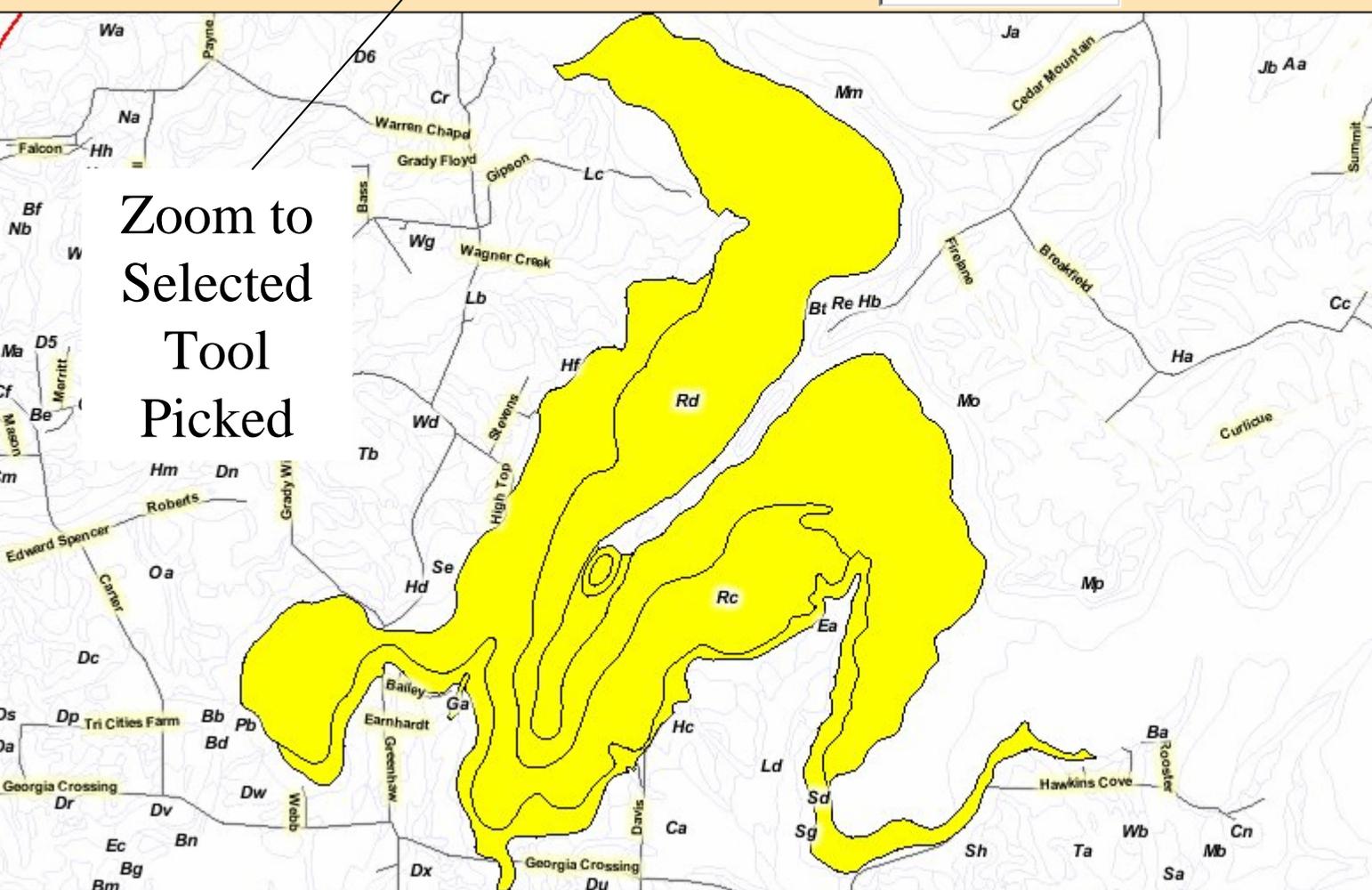
Clear Fields

Add Photos

Create Field Objects

Show Legend

Zoom to Selected Tool Picked



- TN Roads
- Tennessee Soils (SSURGO)
- Counties
- NHD Streams
- NHD Stream Area
- NHD Waterbody
- DOQQ_Index
- DOQQ Image

Point

Partial List of Future Website Functionality

- Add User Defined Field Attributes
- Calculate Field Spreadable Acres
- Produce Table of Field Attributes - both User Input and Calculated (ie. Area, Perimeter, etc.)
- Export Field Information to Spreadsheet/Text File
- More Drawing Tools Providing User Greater Flexibility During Object Creation
- Automatic Generation of Specific Maps

QUESTIONS?