Geospatial Agricultural Mapping in the Lower Flint River Basin

Shelly Jones, Mark Masters, James McKimmey; Flint River Water Planning & Policy Center - Albany State University Albany, GA

Intro

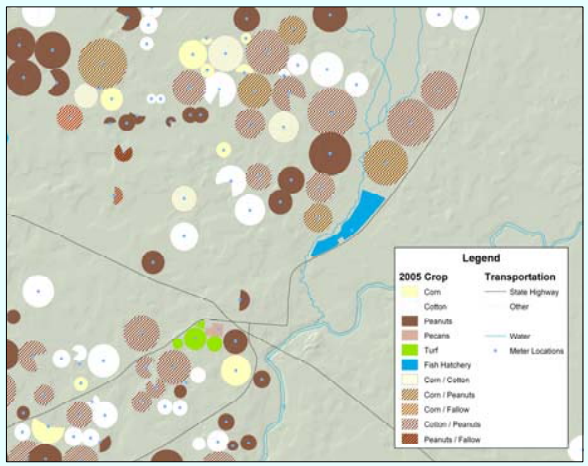
As work begins on crafting a comprehensive statewide water management plan, the desire to illuminate agriculture's impact on the water resources of Georgia transforms into more of a necessity. To aid in this discovery, a dynamic data management system is needed to transform enormous amounts of raw agricultural water use data into valuable information for policy makers and individual agricultural producers alike. Through a contractual arrangement with the Georgia Soil and Water Conservation Commission, the Flint River Water Planning and Policy Center (FRWPPC) at Albany State University built an initial geospatial database around 1,400 GPS locations of installed agricultural water meters in the state. The goal was to add variables to the existing data that could assist farmers in improving the management and conservation of land and water resources while simultaneously providing a solid foundation for agricultural, and statewide, water policy. Using a Geographic Information System (GIS) format data set, FRWPPC field technicians were able to locate each meter, map irrigation hardware, field boundaries, and water sources, and record additional observations impacting water use, including current crops and predominant soil textures. When possible, data was collected on end-gun shut-offs, irrigation efficiency tests, or any other measure pertinent to water use. To increase the significance of the data, meters, fields, and sources were linked together by identification codes, providing a way to analyze water use practically and efficiently based on given attributes. While this project was limited to meters installed prior to the 2005 growing season, it could easily be expanded to include other parts of Georgia as more meters are put into operation.

Methods and Materials

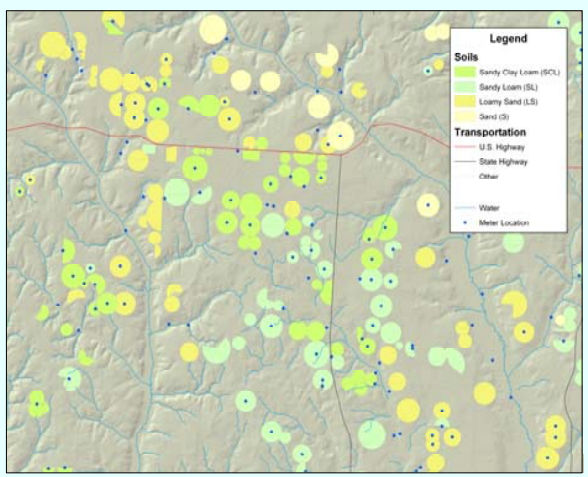
FRWPPC visited 1,355 sites and mapped meter locations, field boundaries, irrigation hardware, and water sources using Trimble GeoXT GPS receivers. Each feature was assigned a unique ID and features were linked to provide for an array of evaluation techniques. Irrigation system configurations, 2005 crop types, water conservation measures, and additional field observations were also collected for each wetted area. ArcView GIS software was effective in extracting and assigning dominant soil textures from USDA-NRCS SSURGO. In addition, a 10% sample of the 2005 installed meters were read monthly to provide insight into scheduling practices of various crops. Information on rainfall events and crop yield were also collected for this sample.

Results

Maps of field boundaries were created to visually identify crop type distribution and totals within counties, basins, and critical water use areas. Meter and source maps also provided visualization of ag water withdrawal trends within the region. When combined with periodic meter readings, this spatial data was, and will continue to be, crucial in calculating accurate ag water use.



Soil texture influences the amount of water available to a crop, thus making it an important factor in agricultural water management. Regions found to have excessively drained soil textures can expect to have more water use than poorly drained soils in a typical growing season. This will be a key factor in establishing reasonable water use throughout various growing conditions. Unfortunately, some of the high water use regions coincide with areas that have the least amount of water to offer.



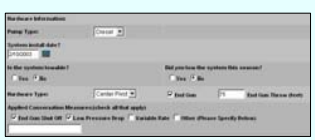
Applications

Spatial and numerical records were incorporated into a statewide database for management purposes. Meters, fields, and sources were linked together to provide additional methods of analyzing water use practically and efficiently based on their attributes, and to help establish reasonable use. This information can also be augmented with existing database and land information such as elevations, land use, transportation, hydrography, etc. to gain further insight into areas where ag water conservation is most appropriate and beneficial. These can also be valuable in evaluating and forecasting ag water use through various modeling applications.

When GPS field data is applied to current aerial imagery and made accessible to individual farmers, the ability to verify, personalize, and update information each growing season can increase dramatically.

State-wide GIS feature layers such as hydrology, roads, and county boundaries can also be added to aid users in correctly distinguishing their field locations.

By creating a database of mapped locations that remain constant over longer periods of time, precise variable information such as crops, water use, and water conservation measures can be updated periodically to enhance the overall value of the GIS data and help Georgia effectively analyze and manage agricultural water use.



Shelly Jones
125 Pine Avenue, Suite 240
Post Office Box 345
Albany, Georgia 31701
Phone: 229-430-2900
Fax: 229-878-1998
Website: www.h2opolicycenter.org
Email: sjones@h2opolicycenter.org