

# Pesticide Residue Query Tool: A Web-Based Decision Support System

Stone has developed an Arc-GIS Server-based Pesticide Residue Query Tool (for a confidential client), designed to allow product managers and farmers to efficiently access and visualize vast amounts of field-scale pesticide environmental fate modeling results and understand what conditions are appropriate for different agronomic practice. With this information, managers and scientists can determine appropriate regions for product use and pesticide label requirements which protect both the crops and environmental quality. The tool, which started as a desktop database application, was migrated to the web to allow access to a broader number of decision makers

## Making Enormous Datasets Accessible

Modeling to predict pesticide environmental fate was conducted for 6 crops in 10 states. Since the original model results represented hundreds of gigabytes of data, Stone worked with the client to determine priority scenarios to make available in the application. All query results were preprocessed for the identified scenarios to reduce the processing time for the users. The results of these queries are stored as attributes in 16 file geodatabases, each containing 7 feature classes with between 10 and 200 attribute fields.

## Query Tool Interface and Mapping Application

A custom Pesticide Query Selection Form was designed with a series of dropdown selection fields that guide the user through the selection of crop, geographic region, pesticide application, irrigation scenario, and query results (Figure 1).

The form provides the user access to over 10,000 different possible results. In order to make this number of preprocessed results available, custom code was written to interpret user input from the form to determine which map service, which feature class, and which field to

display. A geoprocessing model recalculates the feature class “display field” which represents the data displayed on the map.

The user interface is driven by tabular data stored in a one of the file geodatabases. The new query related records functionality, available with ArcGIS Server 10, was implemented so that the user would only be viewing appropriate choices based on their previous item selection.

The application was built with ESRI's ArcGIS Server software, using their FLEX API Rich Internet Application tools. The result is an extensible, graphically inviting mapping and information retrieval tool.

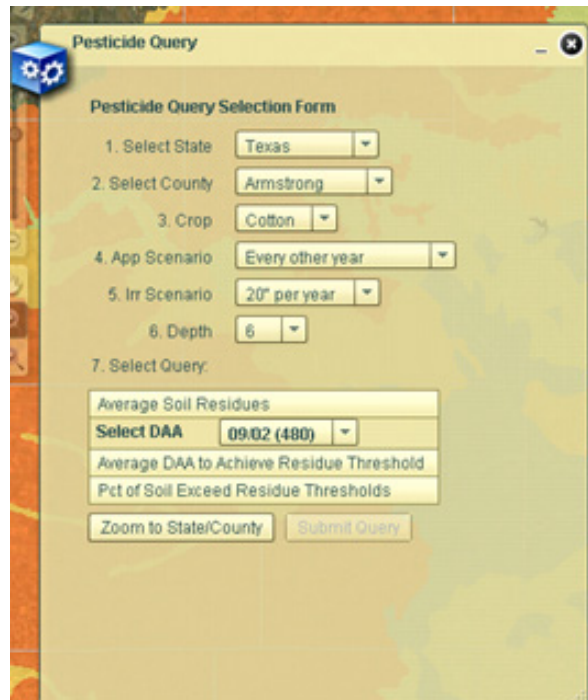


Figure 1. Custom Query Selection Form

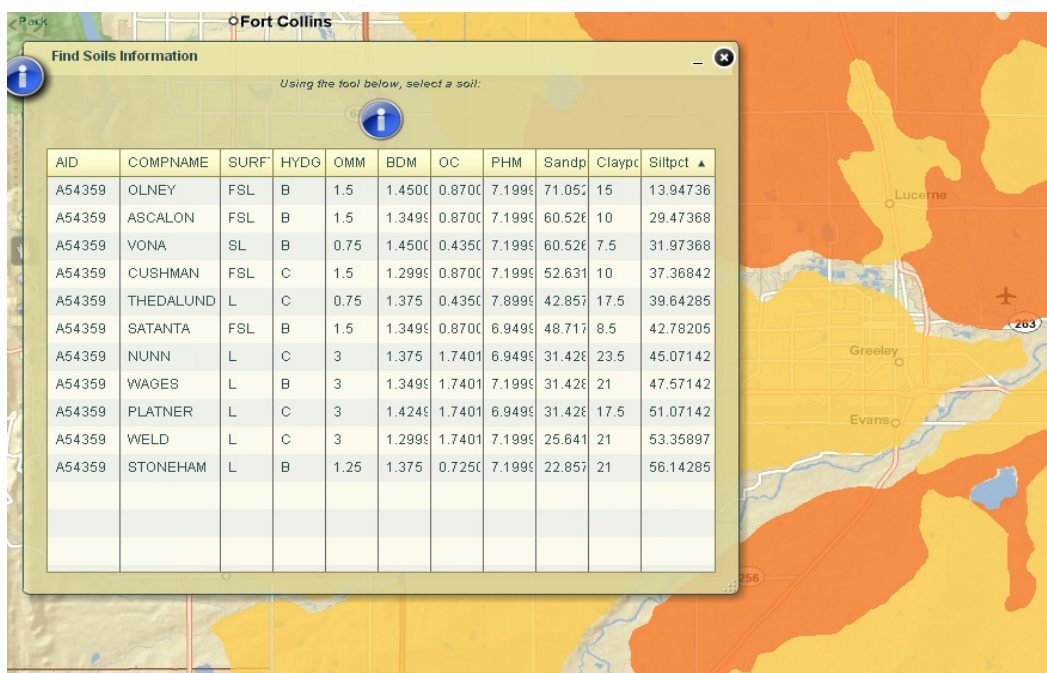


Figure 2. The Identify Related Records Tool returns detailed soils information for each soil polygon.

Spatial data includes the State Soil Geographic data layer (STATSGO) for most states and more detailed Soil Survey Geographic data layer (SSURGO) for selected states where modeling was based on the more refined soils polygons. The application utilizes the readily available ArcGIS online World Street Map and World Imagery map services for base map layers.

### Customized Tools

The application took advantage of several pre-built FLEX widgets that were then customized to meet the needs of the client.

- The dynamic legend widget was customized to display a label identifying which crop and agronomic scenarios were selected by the user;
- The identify widget was customized to return soil polygon related records to drill down to the STATGO and SSURGO detailed data (Figure 2);
- The data query and export tool was implemented to allow the user to graphically select an area of interest and export the results for the selected polygons. The tool was customized to return the results for the scenario selected by the user in the form.

### Numerous Applications

Stone envisions that applications like the Pesticide Query Tool will become more common as a method for making vast amounts of technical data available to scientists, farmers and industry specialists.. The applications for similar web-based mapping approaches for communication of pesticide label restrictions, application requirements, and best management practices are numerous.

Stone looks forward to continued advancement in web-mapping technologies and to implementing those technologies to develop spatially oriented systems that enhance good stewardship practices within the agrochemical industry.

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