
SOLE: Enhanced FIA Data Analysis Capabilities

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Abstract.—The Southern On Line Estimator (SOLE), is an Internet-based annual forest inventory and analysis (FIA) data analysis tool developed cooperatively by the National Council for Air and Stream Improvement and the Forest Service, U.S. Department of Agriculture's Forest Inventory and Analysis program at the Southern Research Station. Recent development of SOLE has enhanced data analysis capabilities to include diameter-based categorization of variables, mapping based on plot hex, and tree-volume growth projections. The breadth of analysis options provides a powerful system for FIA data mapping and analysis (<http://ncasi.uml.edu/SOLE/>).

Introduction

Internet-based database analysis tools maximize the accessibility of databases. Developers can specify data retrievals and analysis algorithms that ensure correct data analysis. The nuances of complicated analyses can be “hidden” behind a simple interface. Thoughtful software development empowers users to quickly and easily explore data they may otherwise never use.

The Southern On Line Estimator (SOLE) is an online annual forest inventory and analysis (FIA) data analysis tool that has been operational for 3 years. Users select an area of interest; quantitative and qualitative variables; filters (optional); and a tabular-, chart-, or map-based analysis. The mechanics of using SOLE are available in a previous FIA Symposium paper (Spinney, Van Deusen, and Roesch 2006) and also in the integrated online help files. This paper describes interface enhancements and additional analysis capabilities.

Interface Enhancement: Polygon Data Retrieval

The first interface enhancement provides the ability to select data via user-drawn circles and polygons. To access this feature, the user must first select States(s) on the **US Map** tab and activate the **Select States then Counties** button. SOLE automatically advances the user to the **Data** tab. By default, the county-level data selection on the **County Tools** subtab is activated. Choose the **Draw Tools** subtab to use the polygon selection tools. (See figure 1.) The following four Draw Tools are available:

1. Zoom: Left clicking zooms in on the map and right clicking zooms out.
2. Draw Polygon: Left clicking adds sides; right clicking adds last side and closes the polygon. After the shapes are drawn, user-defined shapes will be outlined in red.
3. Draw Circle: A popup window will ask if you want to draw your circle freehand or if you want to manually enter center coordinates and radius. After the shapes are drawn, user-defined shapes will be outlined in red.
4. Select User Shapes: Activating this tool turns the map background gray. Left clicking a user shape will select the shape and turn it green. Note: One or more shapes must be selected before the **Retrieve Data** button is pressed.

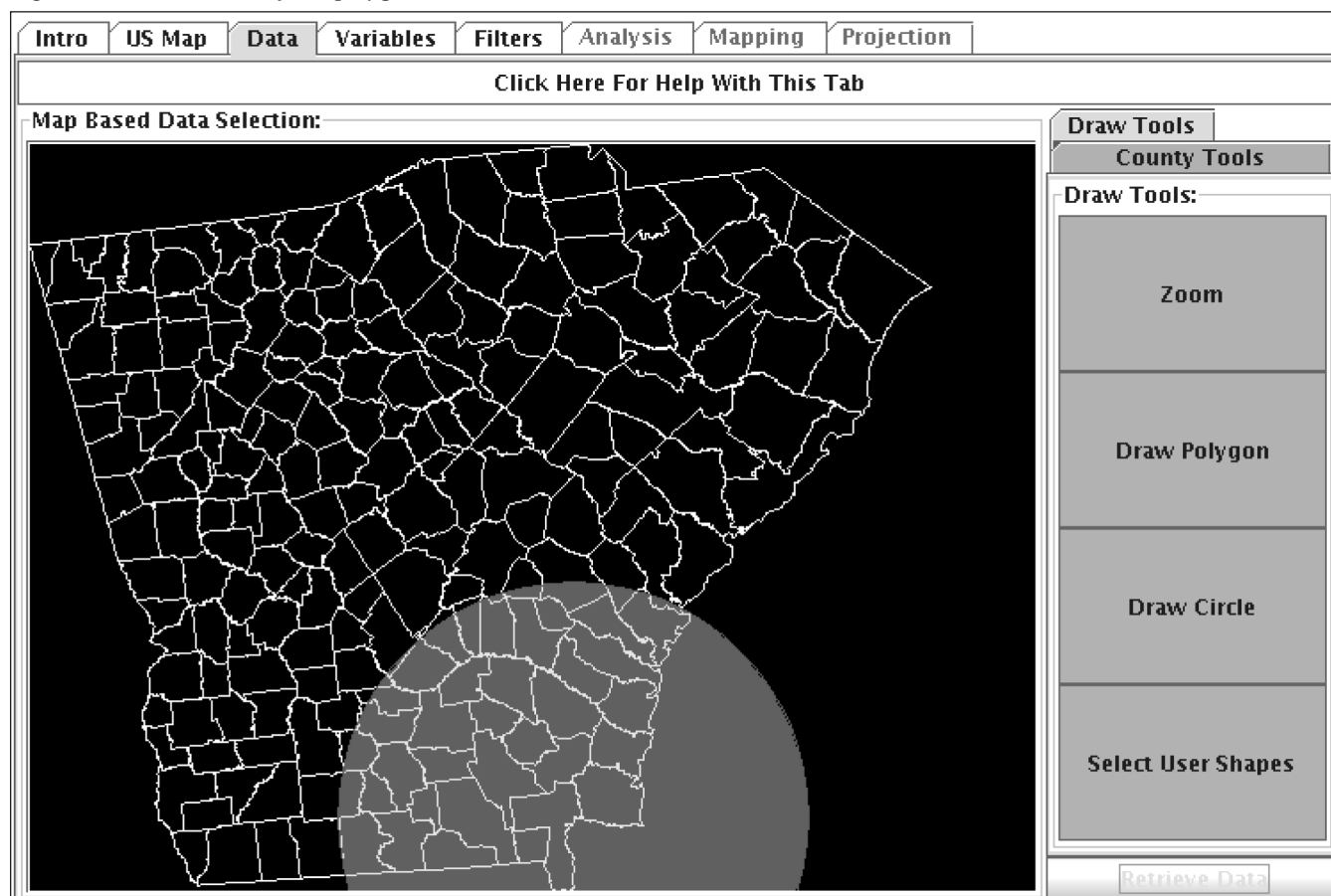
New Analysis Capabilities

SOLE now offers the capability to analyze volume and biomass variables in 5-in diameter at breast height (d.b.h.) classes. These classes increase the precision of estimates through indicating the allocation of a variable over the diameter distribution, which also acts as a proxy of wood product class. d.b.h. classes can be used as a qualitative (factor) variable (on **Variables** tab) or as a filter (on **Filters** tab).

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Figure 1.—SOLE's user-defined polygon data retrieval.



The user can also produce maps based on FIA plot hex, which are the 2,402.6-ha hexagons encompassing each FIA plot that completely tessellate the State. Using this plot hex mapping method increases spatial mapping resolution over the county or State level. The user can choose hex mapping options to map the individual plot hex values for any qualitative or quantitative variable, or produce a loess-smoothed response surface.

SOLE also offers the option to generate a 40-year projection of potential timber yield for accessible forest land in a State. SOLE's projection analysis "grows" FIA inventory plots ahead in time using a hotdeck matching technique (Sande 1983). These management scenarios provide input to a harvest-scheduling program that estimates potential yield trends for accessible forest land. Public land and land close to cities are assumed to be unavailable for timber harvesting, and all other private land is assumed to be accessible.

The Habplan harvest scheduler (<http://ncasi.uml.edu/projects/habplan/>) was used to implement a landscape management plan over a 40-year planning period. Harvest scheduling, as defined here, requires the State to be divided into polygons with a list of potential management regimes for each polygon. The polygons for this application are FIA plot hexes. In any given year, a plot can be clearcut or left to grow another year. A regime denotes the timing of outputs that will occur if this regime is followed. A schedule is produced by assigning one regime to each polygon. Van Deusen (2001) provides additional information about Habplan's formulation.

The broad spatial scale (from the perspective of operational forest management) of FIA plots is reflected in the simple formulation of potential management action. Within the 40-year planning period, harvest can reoccur provided at least 20 years have elapsed between harvest events. Forest management

is assumed to be sustainable and follow best management practices, and timber growth/removals rates are assumed to remain relatively stable from one year to the next.

Projection analysis results in current and projected estimates of growing stock and potential removals. SOLE's projection analysis option is a work in progress. The harvest scheduling assumptions are relatively simple and the projected removals estimates are intended to indicate a general trend in potential timber harvest. They should not be confused with FIA's growth removals mortality data.

Conclusions

Internet-based FIA analysis tools are essential for proper analysis of FIA data. SOLE provides a simple interface that enables users to obtain customized analytical results. Flexibility in each component of SOLE ensures that SOLE remains highly adaptable to changes in both database structure and user needs. Recent data analysis development has leveraged SOLE's modular structure to enable polygon-based data retrievals, mapping at the plot hex level, projecting growth and removals via harvest scheduling, and classifying volume and biomass estimates by 5-in diameter class.

Acknowledgments

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