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SOLE: Enhanced FIA data analysis capabilities

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Abstract

The Southern On Line Estimator (SOLE), is an Internet based annual FIA data analysis tool developed cooperatively by the National Council for Air and Stream Improvement and the USDA Forest Service'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 provide 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 utilize.

The Southern On Line Estimator (SOLE) is an on-line annual 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 past FIA Symposium paper (Spinney et al. 2004) and also in the integrated on-linehelp files. This paper describes interface enhancements and additional analysis capabilities.

Interface Enhancement: Polygon data retrieval

The first interface enhancement is the ability to select data using 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*** sub-tab is activated. Choose the **Draw Tools** sub-tab to use the polygon selection tools (Figure 1). The four Draw Tools available are:

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. Once drawn, user defined shapes will be outlined in red.
3. Draw Circle: A popup window will ask if you want to draw your circle free-hand, or if you want to manually enter center coordinates and radius. Once drawn, user defined shapes will be outlined in red.
4. Select User Shape: Activating this tool turns the map background grey. Left clicking a user shape will select the shape and turn it green. Nota bene: One or more shapes must be selected before **Retrieve Data** button is pressed.

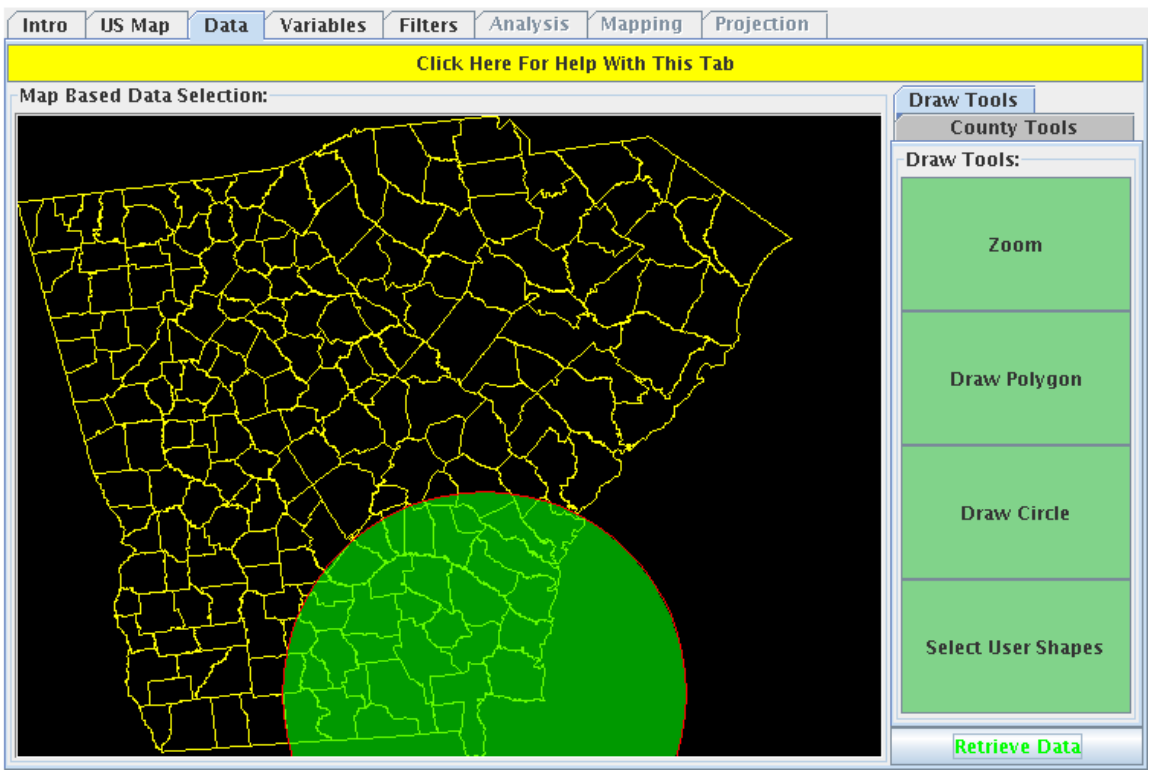

Figure 1: Polygon data retrieval in SOLE.

New Analysis Capabilities:

SOLE now offers the capability to analyze volume and biomass variables in 5" diameter at breast height (DBH) classes. These classes increase the precision of estimates through acting as a proxy of wood product class. DBH classes can be used as a qualitative (factor) variable (on **Variables** tab) or as a filter (on **Filters** tab).

The user can also produce maps based on FIA plot hex, which are the 2402.6 hectare hexagons encompassing each FIA plot that completely tessellate the state. SOLE uses publicly available data, which includes perturbed plot coordinates. The plot is approximately located somewhere within the plot hex. 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 yield for accessible forest land in a state. Public land and land close to cities is assumed to be unavailable for timber harvesting, and all other private land is assumed to be accessible. SOLE's projection analysis "grows" FIA inventory plots ahead in time using a hotdeck matching technique. These management scenarios provide input to a harvest scheduling program that estimates potential yield trends for accessible forest land.

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. Additional information about Habplan's formulation can be found in Van Deusen 2001.

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 re-occur provided there is at least 20 years between harvest events. Forest management is assumed to be sustainable and follow best management practices, and timber growth/removals rates 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 simplistic and serve as a rough trend in timber removals. 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 (GRM) data.

Conclusions

Internet-based FIA analysis tools are essential for proper analysis of FIA data. SOLE provides a simple interface that allows 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 enabling 5" diameter class estimates.

Literature Cited

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