# Esri News

for Forestry

USFS Platform Helps Investors Find New Business Opportunities

By Barbara Shields, Esri Forestry Writer

From fighting forest fires to making long-range plans for managing national forests, the United States Department of Agriculture US Forest Service (USFS) uses Esri technology to make location-based decisions. Among the many users of the US Forest Service's ArcGIS platform is the Forest Inventory and Analysis (FIA) program. FIA creates the nation's forest inventory and publishes it as GIS data layers. These layers are not only important to agency employees managing the national forests, they are also heavily used by private forest landowners, investors, forestry consultants, and forest industry analysts.

FIA products help USFS employ management strategies and practices that align with the needs of today's forest resource users. Seeing the forest census in GIS helps USFS foresters understand current trends. Forest researchers analyze FIA data layers, such as woody biomass, land cover, grasslands, and canopy density layers, to find new opportunities in the forest for revenue, conservation, and stewardship. Industrial analysts and investors use the FIA layers to evaluate wood supplies and business opportunities.

Under the direction of the US Forest Service's research and development team, FIA has been conducting field inventories for nearly 80 years. Its forestry researchers have always used state-of-the-art technology to measure forest status, condition, and trends. Their analysis has been critical
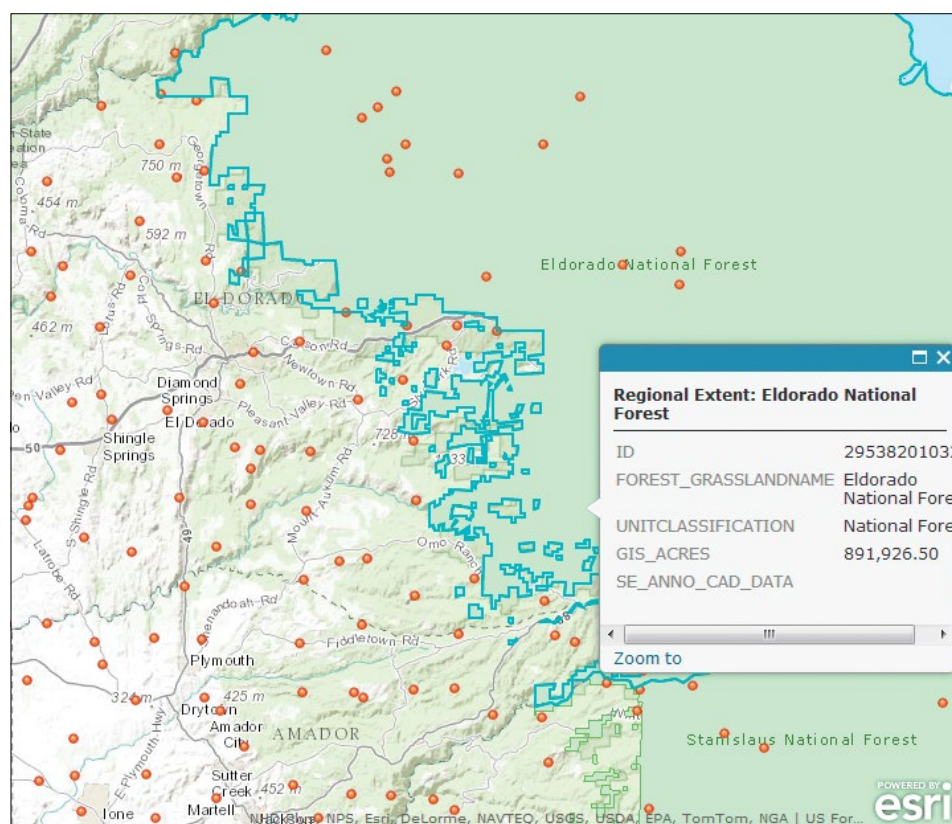
↑ The US Forest Service Proclaimed Forests and Grasslands data layer can be downloaded from the US Forest Service Forest Inventory and Analysis DataMart, published on ArcGIS Online, and consumed as a GIS web map. (DataMart is at fia.fs.fed.us/tools-data.)

to the development and implementation of policies and practices that support sustainable forestry.

Dr. Richard Guldin is the director of quantitative sciences for the USFS research and development team and has led the FIA program since 1996.

"GIS provides context for researchers to explore relationships with the forest ecosystem and the ways these relationships can continue well into the future," Guldin said. "Geospatial tools help the US Forest Service tell the story of America's forests in ways that help people better see and understand what is happening. FIA geospatial products are available to interested

citizens, foresters, and policy makers."

GIS helps researchers employ scientific methodologies to create social data layers, combine them with forest biological and physical information, and produce a broader picture of forest ecosystems. This offers greater insight into how clients and society value and use forests. Social data layers include survey information about the management objectives and interests of private forest landowners. Economic trends can be understood by assessing wood consumption and outputs of the forest products industry.

FIA researchers also use GIS to quantify and visualize biological, physical, and social conditions, which become the foundation for decision making and policy formation. FIA's contextual computing technologies include GIS cloud-based services, multiple platforms, mobile devices, and information products that have been compiled from multiple services.

Among its forestry products is an insect and disease risk map portfolio that includes data and maps about the risk and prevalence of two dozen different insects and diseases. Its fire portfolio includes maps that show burn severity in pre- and postfire comparisons and ecological dynamics in fire-ridden locations.

Outside organizations, such as large-scale enterprises, also use forest census information. A utility company used the data to locate biomass so it could build a thermal energy generation site. Another company used the census data to see where timber is available for building a large-scale electricity generation facility. Major forest product firms across the United States use FIA data to study supply chain issues and make nine-figure investment decisions about paper machine and boiler rebuilds.

Forest census data is also used by small-scale ventures. For instance, managers for a major distillery were looking for an area where the company could make quality white oak barrel staves. They found just the right site, built a barrel stave sawmill, and created more than 25 jobs in a nearby rural town.

The National Aeronautics and Space Administration (NASA) recently funded the North American Forest Dynamics Project to determine the role of forest dynamics in carbon balance. For this project, FIA used Landsat information to map tree cover change data that characterizes and validates disturbance patterns and recovery rates for forests across the continent.

FIA developers and partners completed a continental United States (CONUS) map product at the 250 m scale and are now working on the project at the 30 m scale level. The map is based on information from more than 300,000 FIA field plots.

The USFS recently launched a raster data service that offers imagery at 30 m resolution to define forest structure. To create a complete view of the land with partial data, FIA analysts used the NN imputation mapping method to build raster data surfaces from its forest inventory data. This method included various approaches for estimating a dataset's missing values by using the known values
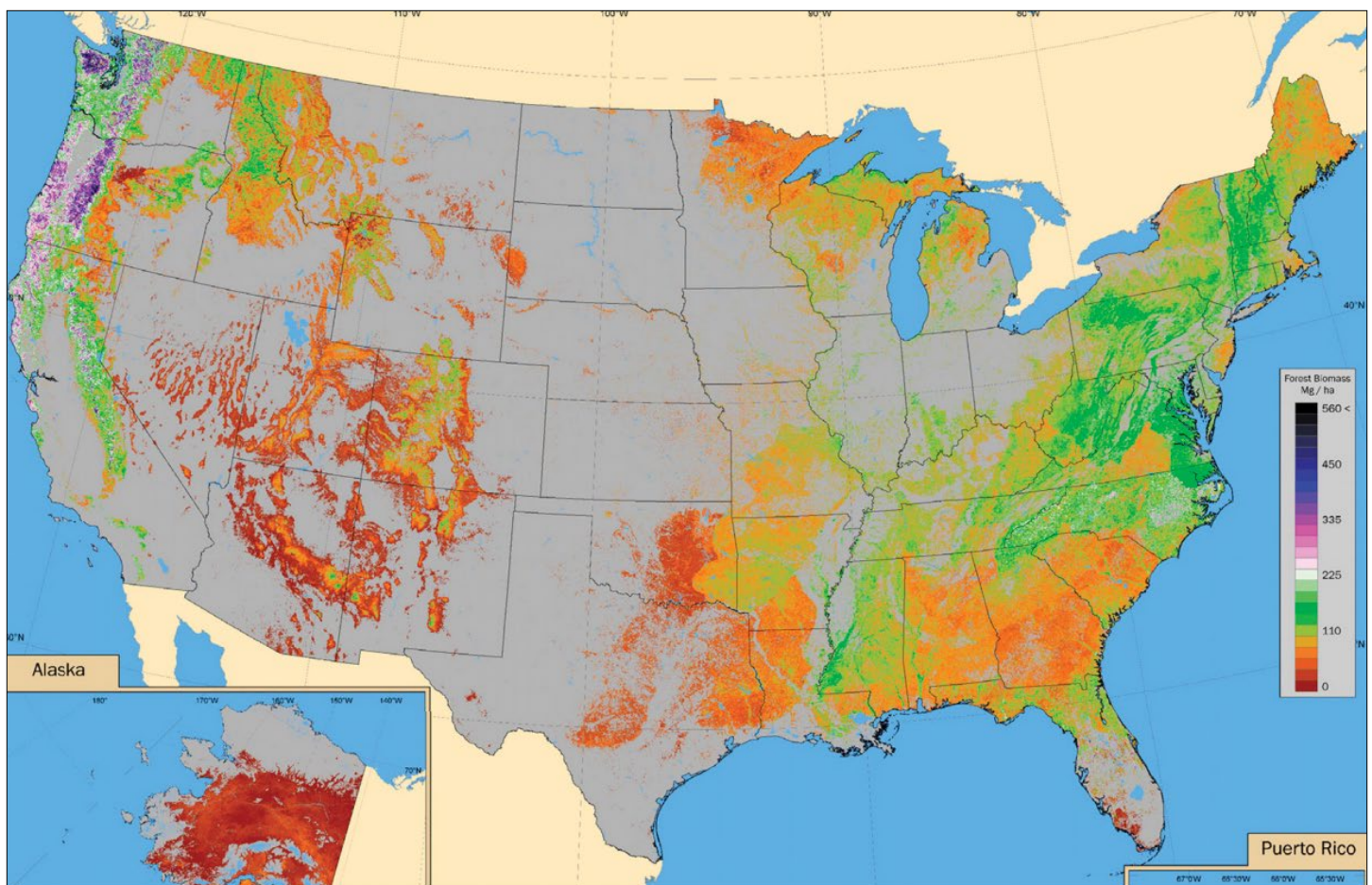
↑ This map shows the density of aboveground biomass, which includes the dry weight of live trees, stumps, branches, and twigs. (J. A. Black.)

Biomass
(Mg/ha)

225

110

0

☐ nonforest

■ water
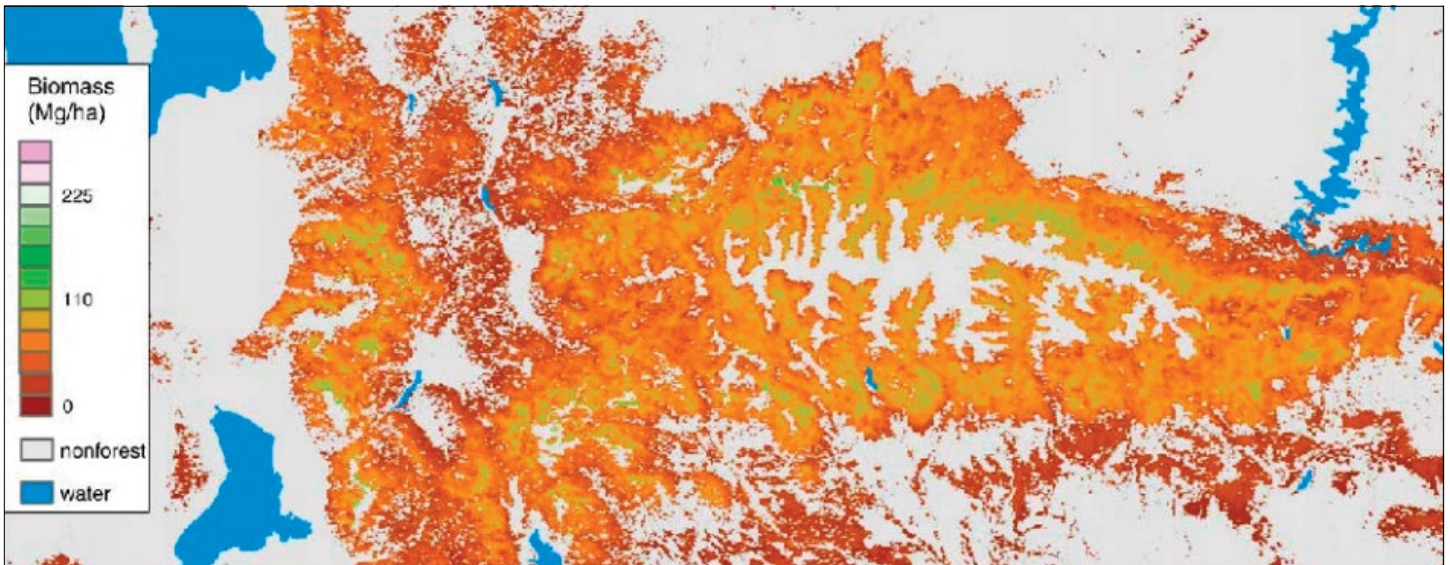
↑ Forest researchers use geospatial statistical models to plot biomass located in the Uinta Mountains, Utah.

↑ Forest researchers rely on forest inventory reports to gain a better understanding of ecosystems. (Laura Kenesic, PhD, USFS.)

in that same dataset.

The Forest Atlas of the United States is yet another FIA project. It explores questions about the value of American forests and the challenges that confront them. In addition, FIA is publishing the atlas's data layers as a web service. This content comes from many data providers and includes links to their data repositories such as ArcGIS Online.

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