



# MAPPING THE FUTURE

How online maps serve as  
valuable tools for forest  
research management planning

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An important component of any forest resource management plan is the maps that show the location of property, its boundaries and access, key features, including roads and drainage, and its breakdown into management units, with forest stands usually being the fundamental management unit.

For a simple management plan this might be accomplished with a single map, and for more detailed management plans, this might require a series of maps. Maps are crucial to forest management planning and can prove invaluable as aids in visualizing the geography of how forest management will proceed. Forest owners may not realize that there are many free online sources of maps; we outline these sources, describe the types of maps available, and present descriptions of the websites.

Forest resource management plans are based on goals and objectives, using silviculture and forest management techniques to develop alternatives to achieve those objectives, and, once the forest owner selects the optimum alternative, development of a course of action to implement the plan. That sounds complicated and it can be. A map or maps can serve as an aid for the forest owner, forester, and other users of the plan for visualizing the layout of the forest and how the management plan elements coalesce to impact the forest. A map can be worth a thousand words in terms of explaining the interconnected forest stand layout and interactions between elements of the plan.

One purpose of a forest resource management plan is to organize the forest property in terms of the physical, cultural, and managerial features that form the framework for the plan. It is a visual delineation of the forest attributes and summarizes key features that will interact geographically as the plan is implemented. In simpler terms, maps allow the forest owner to more easily see current forest conditions and what the future forest may be expected to look like

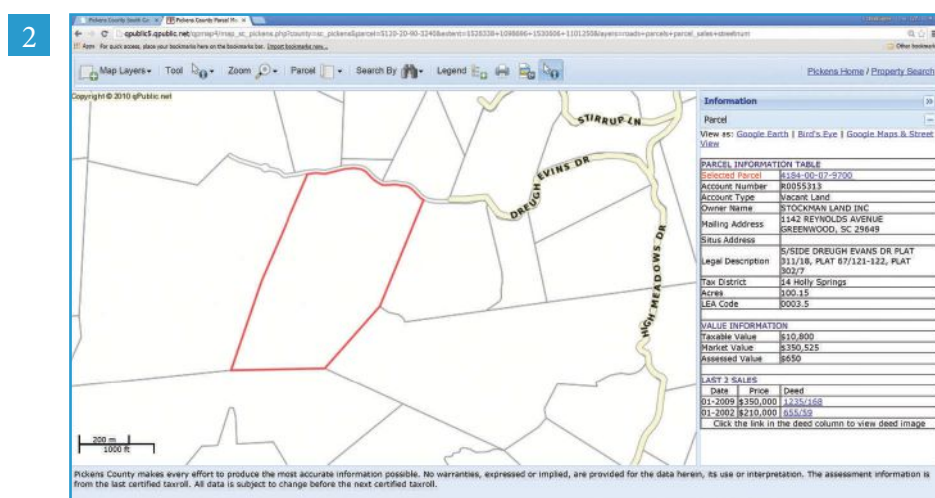


Figure 2: Example of web mapping and parcel data from Pickens, SC assessor website.

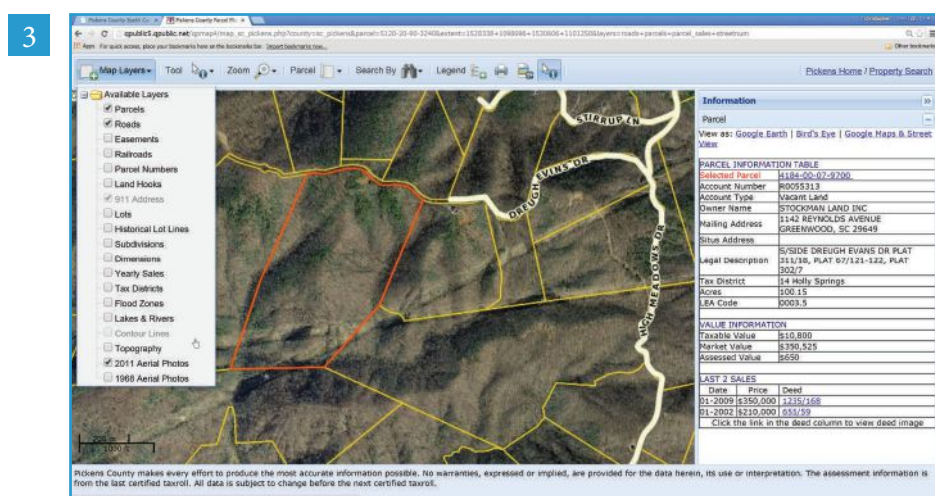


Figure 3: Example of aerial photo layer on the Pickens, SC assessor website.

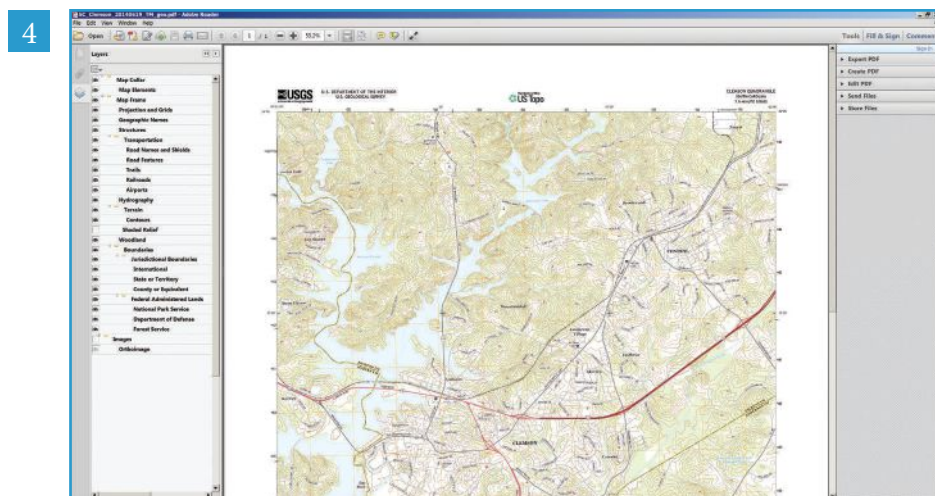


Figure 4: Digital U.S. topography map showing available map layers.



**Table 1. Websites that provide links to parcel boundary layers**

State	Website
Alabama	<a href="http://www.alabamagis.com/">http://www.alabamagis.com/</a>
Florida	<a href="http://www.appraisers.com/consumer/tax_assess/florida.php">http://www.appraisers.com/consumer/tax_assess/florida.php</a>
Georgia	<a href="http://gaassessors.com/">http://gaassessors.com/</a>
Kentucky	<a href="http://www.kypvas.com/">http://www.kypvas.com/</a>
Louisiana	<a href="http://www.louisianaassessors.org/assessors.html">http://www.louisianaassessors.org/assessors.html</a>
North Carolina	<a href="http://www.ncspo.com/gis/county.htm">http://www.ncspo.com/gis/county.htm</a>
South Carolina	<a href="http://scassessors.com/">http://scassessors.com/</a>
Tennessee	<a href="http://www.assessment.cot.tn.gov/RE_Assessment/">http://www.assessment.cot.tn.gov/RE_Assessment/</a>
West Virginia	<a href="http://www.wvassessor.com/">http://www.wvassessor.com/</a>

Please note: These are just example sites run by both public and private entities and are not comprehensive.

if the plan is properly implemented. Since a key purpose of the management plan is to communicate this movement from present to future forest conditions, maps are one of the clearest tools to describe what the plan is expected to accomplish.

Too many maps in a forest management plan can be distracting. A few key maps, or perhaps even just a single map with sufficient detail, are all that is needed in a management plan. One map, well-drawn, can accomplish multiple purposes. Certain maps are commonly expected in a forest management plan. In many parts of the country, legal land descriptions using the Public Land Survey System can adequately describe land location. In other areas of the country, especially those surveyed under the metes and bounds system (most of the original 13 colonies), a location map is expected so that any plan user can locate the property. A legal description of the forest property or a legal map is necessary to ensure forest management activities are taking place on property that the forest owner actually owns. This seems simple, but many plans omit this basic foundation: a map to show where the property is located and another to show the legal boundaries of the property. That is a logical starting point.

The maps used in forest resource management planning can be divided

into base maps and operational maps. Base maps are the foundation of the plan; they show how the forest is subdivided, forest stands, and the features of the forest (for example, forest types, soils, drainage, roads, age classes, boundary lines, property corners, and topography). Each one of these types of information, or layers, can typically be added or removed from view in an online map. You can think of them like layers of a cake that you combine to get a complete map of the forest. Operational maps are used for planning current forest management activities, like timber harvesting plans, prescribed burning plans, road building plans, or fertilization/herbicide application plans. We will limit our discussion to base maps commonly included in forest resource management plans. These are more general maps and the kinds that are now readily available online at no cost.

## LOCATION AND LEGAL DESCRIPTION MAPS

Availability of a plat or legal map of a forest property varies by location. Some counties have excellent mapping systems and others are still paper based. Fortunately, more and more counties are moving these maps online. Many of these systems include parcel boundaries, ownership

information and can even include extra layers such as aerial photos and flood maps.

To find these online maps for a particular county, you might be able to use a private or state clearinghouse website or you might have to use a web search engine. Key terms to use in a search engine like Google would include the state, county and keywords such as “assessor,” “tax,” “parcel,” and “GIS.” County assessors typically maintain and share this type of data. When you get to a particular county website, you might need to search for a parcel based on an owner’s name or street address and then look for buttons like “MAP” or “GIS” to enter the map system. In other counties you can go directly into a map website where you can search for property boundaries or parcels. It’s important to remember that the parcel boundaries shown can have some errors and a survey is required to determine a legal boundary.

Let’s go through an example to show the type of information that may be available. The Pickens County (S.C.) Assessor maintains an online mapping site that provides access to both parcel map and ownership information (<http://www.pickensassessor.org/>). You can search by a parcel number, owners name or address. Searching by address gives you a list of all the records that



A screenshot of the ArcGIS Desktop interface. The top menu bar includes File, Edit, View, Window, and Help. Below it is a toolbar with icons for opening files, saving, printing, and other standard GIS functions. The main window displays a map of the San Francisco Bay Area, showing water bodies, land cover, and infrastructure. A red line highlights a specific route or boundary across the map. On the left side, there is a 'Layers' panel listing various data sources such as Map Catalog, Map Series, Topo Base, Population and Birds, Geographic Names, Boundaries, Transportation, Road Names and Shields, Road Features, Trails, Railroads, Airports, Hydrography, Towns, Counties, Shaded Relief, Watershed, Boundaries, International Boundaries, State or Territory, County or Equivalent, Federal Administrative Units, National Park Service, Department of Defense, Forest Service, Imagery, and Orthorectified. On the right side, there is a 'Tools | File &amp; Style | Contents' panel with options like Report PDF, Create PDF, Data Map, Save Files, and Share Files. The status bar at the bottom indicates the current scale and coordinate system.

Topographic maps provide basic information on elevation, drainage, roads, vegetation, man-made features, and, of course, topography. They even can alert a planner to a historical or cultural feature that is not apparent on other maps or aerial photographs. These maps, created by the U.S. Geologic Survey (USGS), typically represent 7.5 minutes of latitude and 7.5 minutes of longitude and have a scale where 1 map inch represents 24,000 inches (or 2000 feet) on the Earth. While it's possible to purchase the paper version, the digital versions in PDF format are freely available and let you turn on and off a map's layers (topo lines, water features, roads, etc.) and even turn on an aerial photo background. To download one of these digital 'topo quad' maps, go to the USGS Map Locator and Downloader and choose "Mark Points" to select an area and add the digital map to the shopping cart. You can turn off and on different items (including the aerial photos) by clicking next to the layer list on the left side of the map (Figure 4). The same map can be viewed with the aerial photo or "Orthophoto" turned on (Figure 5).

Many of the government mapping websites have been combined into the U.S. National Map which offers easy access to various map and layer types (<http://viewer.nationalmap.gov/viewer/>) (Figure 6). The website has a large U.S. map and the user merely zooms in on the area being mapped. Different map layers are

Web Soil Survey

Web Soil Survey at egs.usda.gov/soils/soils.aspx

NOTE: For each state, there are your location here on the toolbar bar. [Select location...](#)

Current State: **South Carolina** | Archived Soil Surveys | Soil Survey Station | Resources | Professional | Link | Logout | Help

Area of Interest (AOI) | Soil Map | Soil Data Explorer | Download Data Tools | Shopping Cart (0)

Search | Printable Version | Add to Shopping Cart

Map Unit Legend

Pickens County, South Carolina (SC037)

Map Unit Symbol	Map Unit Name	Area in AOI	Percent of AOI
Cd1	Cool clay loam, 2 to 6 percent slopes, severely eroded	29.0	3.0%
CdC3	Cool clay loam, 2 to 10 percent slopes, severely eroded	110.3	15.0%
CR1	Cool sandy loam, 2 to 6 percent slopes, eroded	39.8	9.0%
CR2	Cool sandy loam, 8 to 18 percent slopes, eroded	17.9	3.2%
CR2	Cool sandy loam, 18 to 25 percent slopes, eroded	7.8	1.0%
Cr	Chewink silt loam, frequently flooded	22.0	2.8%
Hv1	Hawkes sandy loam, 2 to 6 percent slopes, eroded	37.7	4.9%
Hv2	Hawkes sandy loam, 18 to 25 percent slopes, eroded	98.7	11.0%
Hv2	Hawkes clay loam, 2 to 6 percent slopes, eroded	12.7	1.0%
Hv3	Hawkes clay loam, 8 to 18 percent slopes, eroded	65.7	8.3%
Hv3	Hawkes clay loam, 18 to 25 percent slopes, eroded	24.8	4.4%

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available. You simply need to zoom to your area of interest and can turn on or off different map layers using the overlays section in the upper left part of the page. Map layers available include topographic, aerial, aerial imagery, and hydrology. You can then click on the “Download Data” button on the top-right of the screen. Some of the data this site requires special mapping software (GIS), but the aerial photos and topo maps can be used directly.

## SOILS MAPS

Forests grow on soil. Certainly a map that would present fundamental information to a forest management planner is soil type and related soil properties. From that, a forester ought to be able to form conclusions on vegetation types, silvicultural implications, water relationships, and, the all-important site index or site quality. Soils maps may be too detailed for many forest management plans, but the information on them is certainly crucial for planning purposes. The USDA has made all of its detailed county-level soil surveys digital and freely available online through the Web Soil Survey (WSS). Its website is located at: <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.

You get access to more than just the soils maps. Data ranging from soil properties to site index is available for most areas of the country. To use the WSS, you first have to identify an area of interest on a map by zooming in on the map or using an address/county/state to find your area. You then select an area of interest using the AOI tools and then clip on the “Soil Map” tab to your soils map (Figure 7). To find forest related productivity estimates, you click on the “Suitabilities and Limitations for Use” tab and find forest metrics under the Vegetative Productivity tab. When you select “view rating” you can map site index for a particular species and it will appear both on the map (Figure 8) and in a table. It’s common to find some areas without site index or other productivity numbers, but useful info is often available.

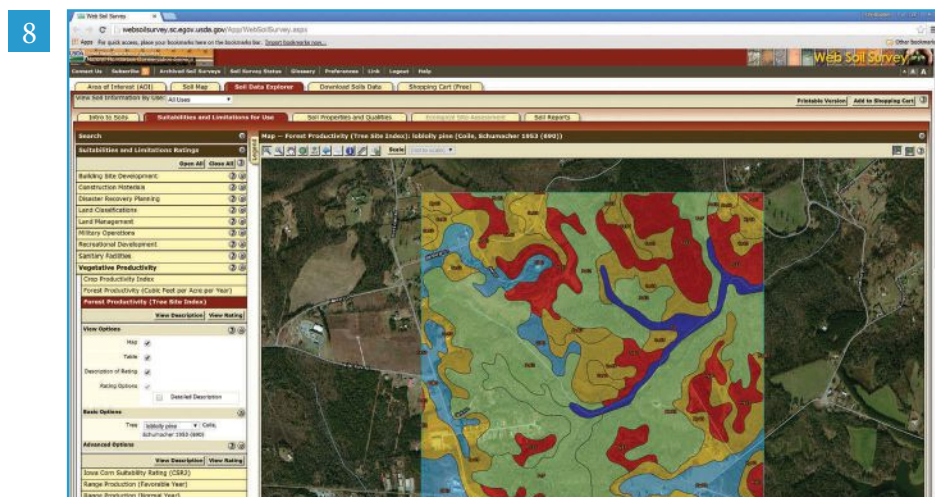


Figure 8: Web Soil Survey map of site index for loblolly pine.

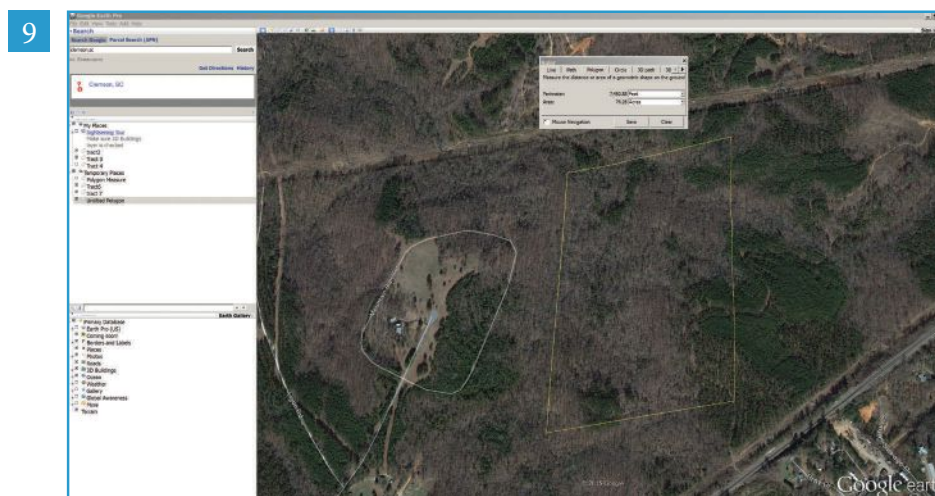


Figure 9: Google Earth's ruler tool is a handy way to measure the area of a tract.

## GOOGLE EARTH PRO

One of the most popular ways to find forest aerial imagery is to use Google Earth. The Pro version of Google Earth is now available for free, which lets you print higher resolution aerial photos and even work with GIS data (<https://www.google.com/earth/explore/products/desktop.html>). Google Earth often has some of the most recent imagery and makes it easy to find your forestland. You can even import data from a GPS receiver such as Garmin or Magellan unit to map an area. It is also possible to calculate the area of a tract using the ruler tool (Figure 9).

## SUMMARY

Maps are an essential part of forest management planning. The common types of maps used are location, topographic, aerial, and soils. All are readily available from websites that are fairly easy to access and use. We described these sites and identified those that offer the product for free. We encourage forest landowners to take advantage of these powerful forest management planning resources. ■

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