US Topo—*Topographic Maps for the Nation*

Building on the success of 125 years of mapping, the U.S. Geological Survey (USGS) created US Topo, a geo-referenced digital map produced from The National Map (TNM) data. US Topo maps are designed to be used like the traditional 7.5-minute quadrangle paper topographic maps for which the USGS is so well known. However, in contrast to paper-based maps, US Topo maps provide modern technological advantages that support faster, wider public distribution and basic, onscreen geospatial analysis, including the georeferencing capability to display the ground coordinate location as the user moves the cursor around the map.

What Makes US Topo Different from Other Digital Topographic Maps?

US Topo maps are modeled on traditional maps, are designed for nonspecialist users, can be easily printed to correct scale, are published in the public domain, and can be downloaded at no cost. Topographic content of contours, shaded relief, and hydrography together with a base of orthoimagery and many other data layers make US Topo suitable for a wide variety of uses such as natural resource conservation, natural hazards, emergency management, and recreation. Advantages of the US Topo product include the following:

- Credible, self-contained topographic maps for the Nation are readily available.
- Nationally consistent, authoritative data is quality assured to high standards.
- Updates are published regularly.
- Rich content with multiple layers of data is continuously evolving.
- Familiar look and feel of legacy paper USGS topographic maps is combined with advanced technology.
- Versatile formats allow user to view on the screen and to print page-, full-, or custom-sized maps.
- Users can download maps free from multiple interfaces, including TNM Download Client.

What is New About US Topo?

The first US Topo 3-year production cycle (2010–2012) used TNM databases to create a digital, image-based cartographic map that retained the look and feel of the traditional USGS 7.5-minute quadrangle map. In 2013, colors and symbols were redesigned to improve the readability of symbols when superimposed on a digital orthoimage (aerial photograph) background (fig. 1). To resolve the readability issue, the USGS worked with The Pennsylvania State University to redesign the US Topo maps so that map elements are viewable with the imagery turned on and off while keeping the file size as small as possible. The US Topo map redesign included

Figure 1. US Topo map of the Chattanooga, Tennessee, quadrangle.

improvements to various display factors, such as symbol definitions (color, line thickness, line symbology, area fills), layer order, and annotation fonts. Adjusting the transparency of some features also enhanced the visibility of multiple competing layers such as shaded relief and imagery (fig. 2). Also, the river area fill is layered on top of the imagery but is partially transparent so that the user can see the imagery through the blue river area (fig. 3).

In 2017, the US Topo map production system was redesigned and modernized to facilitate long-term goals for more efficient production and for continued product improvements. The new system produces maps in a format that uses a georeferencing mechanism that is ISO 32000 compliant. The production system changes do not affect the look and feel or basic functions of the product. All maps can be viewed and printed with most portable document format (PDF) viewers. Limited geographic information system (GIS) functionality, such as displaying ground coordinates, is available with all maps, and the layered construction of the PDF files allows users to turn data layers on and off. The maps include layers of

geospatial data (orthoimagery, transportation, geographic names, topographic contours, boundaries, hydrography, woodland, and structures) from TNM databases.

Many new feature layers have been added in the past several years. In 2016, a pilot project was completed that incorporated U.S. Department of the Interior National Park Service point features such as visitor centers, picnic areas, and campgrounds (fig. 4). New feature layers also include a change in road data sources to U.S. Census Bureau TIGER data, National

Figure 2.   Shaded relief and image layers.

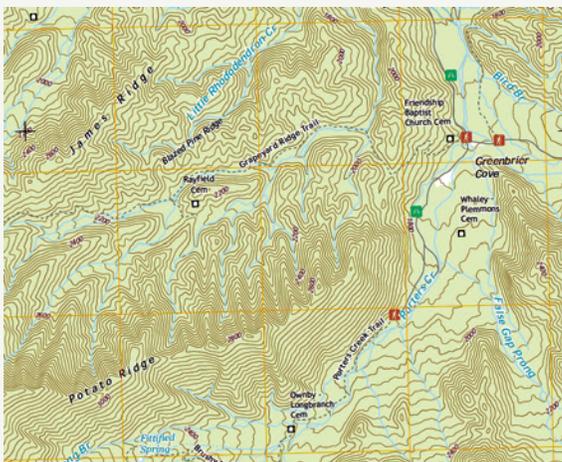**Figure 3.**   Hydrography and woodland area transparency.

Wetlands Inventory data from the U.S. Fish and Wildlife Service, and broader availability of trails data from multiple sources. US Topo users can turn geospatial data layers on and off as needed and zoom in and out to highlight specific features or see a broader area. The file size for each digital 7.5-minute quadrangle is about 30–35 megabytes. US Topo maps can be printed from personal computers or plotters as complete, full-sized maps or in customized sections in a user-desired specific format. Download links and a user guide are featured on the US Topo website. Paper copies of the maps can be purchased from the USGS Store.

Companion vector products (Topo Map Vector Data products) for GIS users are available and may be downloaded from TNM Download Client. The Topo TNM Style Template can be readily used with the Topo Map Vector Data products and other data available for download from TNM. The template and TNM data are best used together to quickly provide GIS users with a fully customizable map in the style of US Topo maps using the most current TNM data.

What Are the Future Plans?

The USGS is committed to completing the third US Topo production cycle (2015–2018) for the 48 conterminous states; continuing support for the Alaska Mapping Initiative; investigating appropriate, nationally consistent scale-content additions; and modifying the US Topo program objectives based on user feedback and technology changes.

Key user and technology concerns may include the following questions. Are staged products and companion products meeting our customer needs? What are the costs, feasibility, and maintenance of a dynamic US Topo production system? Is it time to move to a change-initiated update cycle? Questions such as these will be assessed as the US Topo program evaluates its objectives and focuses on the future vision.

Powered by The National Map

The National Map (TNM) is a collection of national geospatial databases (elevation, hydrography, geographic names, orthoimagery, land cover, transportation, boundaries, and structures) and associated products and services. US Topo is one product derived from these databases—a digital topographic quadrangle map with a fixed scale, traditional layout, and familiar design.

The US Topo provides vital decision-making, spatial awareness, and operational support maps for scientific research, land and resource management, homeland security, disaster response, industry, recreation, and more.

US Topo maps are available for all 48 conterminous states, Hawaii, Puerto Rico, and the U.S. Virgin Islands. Alaska US Topo map production began in 2013. As the US Topo product evolves, the USGS will incorporate more geospatial data layers and features from TNM. Public feedback is encouraged and helps us improve the US Topo concept.

The orthoimage layer of US Topo maps is based on U.S. Department of Agriculture 1-meter ground resolution National Agriculture Imagery Program (NAIP) orthoimagery, a data resource that is tone-balanced, publicly available, and nationally consistent. US Topo production and revision follows the NAIP 3-year acquisition cycle. Alternative image data sources are being assessed and applied for US Topo production in Alaska, Puerto Rico, the U.S. Virgin Islands, and the Pacific territories not covered by the NAIP acquisition plan.

Figure 4.   US Topo map content example (Mount Le Conte, Tennessee—cemeteries, picnic areas, trailheads, trails, and landform names).

For More Information

More details about TNM are available at https://nationalmap.gov/, and contact information is at https://nationalmap.gov/ustopo/.

Download (free) US Topo maps:

- Map Locator and Download application at USGS Store: https://store.usgs.gov/
- The National Map Downloader: https://viewer.nationalmap.gov/basic/
- topoView: https://ngmdb.usgs.gov/maps/Topoview/
- US Topo and Historical Topographic Map Collection: https://geonames.usgs.gov/pls/topomaps/

More downloads:

- Topo Map Vector Data products: https://viewer.nationalmap.gov/basic/
- Topo TNM Style Template: https://viewer.nationalmap.gov/tools/topotemplate/
- US Topo User Guide: https://nationalmap.gov/ustopo/quickstart.pdf