



PROJECT: GPS mapping to facilitate management of recreation areas
PROJECT DATE: Ongoing

PROJECT HIGHLIGHTS

- **USDA Forest Service used GPS handheld receivers to map 558 user-created campsites dispersed over 2.2 million acres**
- **Rugged handheld with high-resolution display and good battery life allowed for full-day data collection**
- **Campsites mapped to within a meter of accuracy. Spatial accuracy needed for monitoring sites and revisiting them in five years**
- **ESRI ArcGIS compatible data dictionary created to collect campsite attribute information ensuring data integrity.**

Home to nine wilderness areas and more than 2.2 million acres of public land in northern Utah, the Uinta-Wasatch-Cache National Forest is an extremely popular recreational area. Residents from neighboring communities such as Salt Lake City and tourists from around the U.S. visit the area year round to enjoy skiing, snowshoeing, hiking, camping, rock climbing, mountain-biking, and more. Others explore Off Highway Vehicle (OHV) trails throughout the rugged and scenic mountain ranges found there.

The United States Department of Agriculture (USDA) Forest Service, the Uinta-Wasatch-Cache National Forest, and the Logan and Salt Lake Ranger Districts, work together to provide recreational opportunities for individuals while managing the area's beauty for future generations. To help accomplish these goals, the Forest is also working with the USDA Forest Service Remote Sensing Applications Center (RSAC).

As a part of implementing the Uinta-Wasatch-Cache's 2003 Forest Plan, the Forest is inventorying locations and resource impacts of user-created campsites in undeveloped recreation areas. These inventories help Forest managers develop strategies for managing recreational areas, with a focus on protecting natural resources for future generations. USDA Forest Service officials wanted to locate these dispersed campsites, collect spatially-accurate data about their locations, and monitor the condition of these sites. To facilitate this, Uinta-Wasatch-Cache National Forest leaders and GIS technicians began an initiative to accurately inventory these user-created campsites.

The team selected Trimble® GeoXT™ and GeoXH™ handheld Global Positioning System (GPS) receivers with TerraSync™ and GPS Pathfinder® Office software to meet the agency's accuracy standards in mapping these sites. Using GPS Pathfinder Office software, USDA Forest Service created a data dictionary, which provided consistent fields to be populated during the collection of GPS and attribute data at the campsites. Consistent tracking of campsite features such as fire rings, litter in the area, and dumping was an integral part of the project. The easy to use GPS Pathfinder Office software data dictionary ensured a high level of data integrity and confidence in the collected information and was compatible with their GIS.

Over a several week period the mapping field crews rode trail bikes throughout areas in the Logan Ranger District and the Stansbury Mountains. Equipped with the GeoXT and GeoXH handheld receivers and digital cameras, they revisited and collected data at 450 previously mapped user-created campsites in the Logan Ranger District and mapped the exact geographic location of 108 user-created campsites in the Stansbury Mountains in the Salt Lake Ranger District.

"Compared to other field software I've used, TerraSync is more user-friendly and more intuitive when it comes to collecting and updating data," said field crew member T.C. Christensen. "I can also differentially correct data for the most accurate representation of these campsites."

In addition to logging each campsite with submeter accuracy and recording critical attribute information, the field crews also used a digital camera to collect visual

THE EQUIPMENT USED ON THIS PROJECT INCLUDES

- GeoXH handheld
- GeoXT handheld
- TerraSync software
- GPS Pathfinder Office software
- Trimble GPS Analyst extension for ESRI ArcGIS Desktop software

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evidence of each campsite. By linking a digital camera to the Trimble handhelds, each campsite photo was digitally stamped with the exact geographic coordinates.

By creating a hyperlink to these photos in ESRI ArcGIS Desktop software, the photos can easily be referenced from the map view. This collected 'rich media' gives the USDA Forest Service a more accurate and comprehensive record of each campsite, which allows for more in-depth tracking and analysis.

After the campsite information was gathered, it was then downloaded onto a desktop computer to create a visual representation of the data.

Equipped with an accurate field-based GIS, the USDA Forest Service can now effectively locate and filter data and pinpoint specific attributes when it's time to revisit these campsites.

Happy with the results of this inventory project, the team decided to take these efforts to the next level. Dividing his time between the office and the field, Thöre (T.C.) B. Christensen is an integral part of this team. He is a Remote Sensing/GIS/GPS Analyst, Recreation Specialist, and Trainer for RSAC's Training and Technology Awareness group. Led by Christensen, the team wanted to further document the degree to which these user-created campsites affect the landscape and influence individual's 'recreational experience'.

"I documented various degrees of vandalism, a car transmission, and even a piece of an old bus dumped in several of the more disturbed sites," said Christensen. "I wanted to determine what, if any, psychological impacts these site conditions have on forest visitors. 'Do these conditions hinder the restorative potential of being outdoors—where visitors don't feel as connected with nature?'"

To gauge visitor perceptions, extensive visual information about particular user-created campsites was collected. By using QuickTime Virtual Reality technology, 360-degree panoramic imagery of selected user-created campsites was collected and these images were hyperlinked to the existing user-created campsite GPS features in the GIS. With this in-depth visual data, Christensen plans to conduct research where he will ask visitors their opinions about how differing degrees of landscape scarring affects their recreation experience. Looking ahead, the RSAC plans to share what they've learned with other departments for greater insight about how recreational resources are being used and how these forests and lands can be better protected. They plan to apply the collected location data to create maps of designated routes and campsites. Through these efforts, the agency hopes to more effectively educate and encourage visitors about responsible ways to enjoy the land.

"We think mapping-grade GPS technology is part of the solution when it comes to striking the balance between supporting recreational opportunities and securing our National Forests," said Christensen.

"In fact we have been using Trimble GPS technology for some time to map various occurrences in the Forest e.g., car dumping sites, fire perimeters, resource law violations, etc. We plan to further use Trimble's mapping-grade GPS technology to conduct additional user-created campsite and user-created OHV inventories in other areas in our Forest."

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