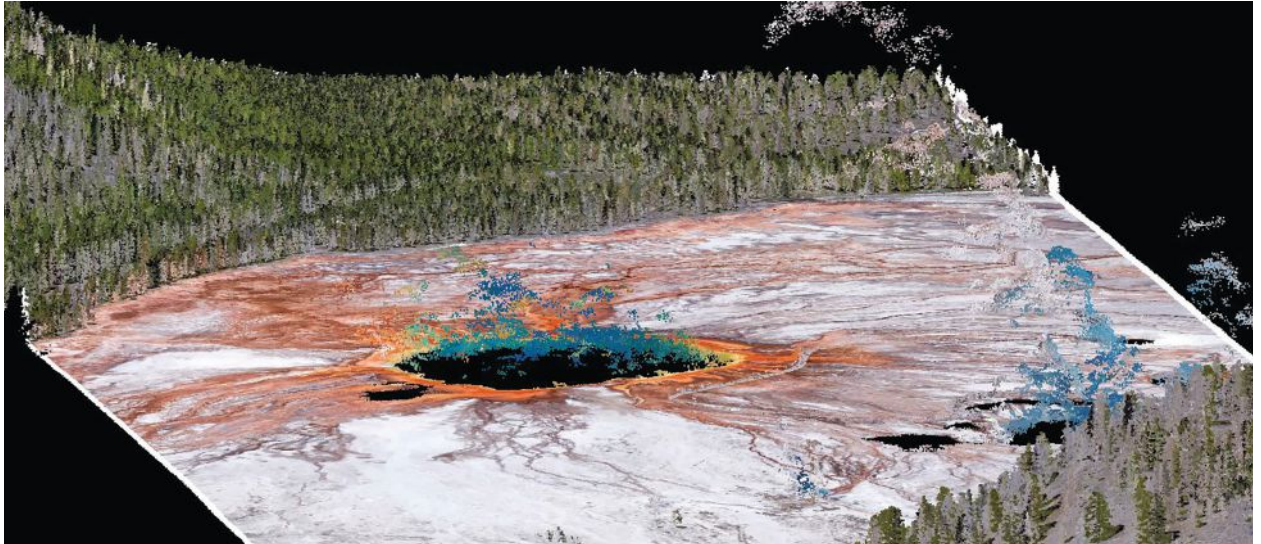# With Great Challenge Comes Great Opportunity:

Mapping Yellowstone, Upper Colorado River

This lidar point cloud shows the Grand Prismatic Spring at Yellowstone National Park's Midway Geyser Basin. Image courtesy of USGS

WOOLPERT
ARCHITECTURE | ENGINEERING | GEOSPATIAL

THERE ARE CHALLENGES INHERENT TO ANY LIDAR and imagery collect, from the rapidly changing shorelines of northern Alaska to the remote logistical challenges of the Commonwealth of the Northern Mariana Islands to the craggy hills and hidden mines of Eastern Tennessee. However, accurately mapping and modeling these topographic and bathymetric anomalies are the key to not only having comprehensive data for myriad applications but are also vital to mitigating the impact of hazards around the world.

Two recent projects that Woolpert performed for the U.S. Geological Survey (USGS) were particularly illustrative of the benefits and challenges of lidar and imagery collects: one was for Yellowstone National Park and Park County, Montana, and the other for the Upper Colorado River near Gunnison, Colorado.

In 2020, Woolpert was contracted by USGS to perform a high-resolution topographic lidar survey over 6,549 square miles of Yellowstone and Park County. The firm flew two aircraft equipped with Leica Geosystems TerrainMappers to collect Quality Level 1 lidar data in Yellowstone and QL2 data in the county. The data will be used throughout the state and by agencies including the Federal Highway Administration and Yellowstone National Park for projects including major road improvements occurring this year.

Woolpert Geospatial Program Director Shelly Carroll said, in addition to navigating a short weather window within a geologically active region, the shadows cast by the tallest overhanging mountain peaks challenged the Yellowstone collect.

"It was like 'How the Grinch Stole Christmas,' with the shadows under the steep and curved peaks blocking the lidar data," Carroll said. "To address this, the peaks will be flown crosswise to fill the gaps in that data. The result will be a comprehensive 3D map to support any existing and future needs."

Wildfire smoke also has become a perennial challenge with aerial acquisitions, with blazes becoming increasingly frequent and intense. Smoke haze from fires even hundreds of miles away can hamper aerial collections. This challenge played a role in Woolpert's Upper Colorado River collect.

Woolpert was contracted by USGS to collect topographic and bathymetric lidar data and aerial imagery to provide information about the Upper Colorado River for water, resource management and ecology studies. The QL1 and QL2 data was collected with a Leica Chiroptera 4X sensor. The flight crew had to find windows of opportunity that included high water clarity, low winds and no smoke haze. Conditions in the river valley can fluctuate quickly, sometimes multiple times a day.

Carroll noted that changing trends in the volume and timing of snow melt is impacting the natural systems and 35 million residents of seven western states. This USGS topo-bathy data will be used by USGS as well as other government agencies and local communities to assist with the understanding and management of water resources.

She added that the precise and up-to-date geospatial data that USGS procures across the country through its 3D Elevation Program are vital to solutions that protect lives and infrastructure from the impact of drought, landslides, earthquakes, wildfires and other hazards.

"The USGS takes an enthusiastic, interdisciplinary approach to providing the big-picture view of how natural systems are connected and constantly changing," Carroll said. "And the USGS mission continues to grow in importance as these data become increasingly integral to governments, businesses and citizens. USGS scientists are driven to contribute to solutions for a better world. Their dedication is inspiring."

COMPANY PROFILE

Woolpert lives where proven methodology and disruptive technology collide. Launching as a four-person engineering and survey company in Ohio in 1911, the firm has steadily evolved to become a full-service architecture, engineering, geospatial (AEG) and strategic consulting firm with more than 1,200 staff and 42 offices in three countries. This fusion of AEG data breeds innovative solutions to address complex geospatial challenges worldwide and provides unparalleled benefits for local, state and federal clients.

Examples of this dynamic integration are many. When tasked with collecting high-resolution imagery and lidar data to map impervious surfaces for stormwater management, Woolpert's water resources engineers confirm the city's needs are comprehensively met. When contracted to conduct aeronautical obstruction surveys for airport layout plans, Woolpert's design team provides creative airspace solutions. When selected to map underwater terrain with bathymetric lidar for environmental monitoring and research, Woolpert's deep bench of strategic consultants supply invaluable international committee and developing standards perspectives.

To round out this expertise, Woolpert has partnered with industry giants like Esri, Google, Planet and Trimble, and has acquired six trailblazing companies in the last three years. These include South Africa-based high-accuracy lidar and survey experts Southern Mapping, international hydrography and bathymetry leaders Geomatics Data Solutions, and data visualization specialists Data Cloud Solutions.

Amid this growth, Woolpert continues to develop and support its global staff. It has been recognized as a Great Place to Work for five straight years and actively fosters a culture of inclusion, diversity and respect.

Contact Woolpert Senior Marketing Manager and Associate Kim Hansen at 704-526-3072 or kim.hansen@woolpert.com. For more information, visit Woolpert.com.