United States Department of Agriculture
Forest Service

PACIFIC SOUTHWEST REGION

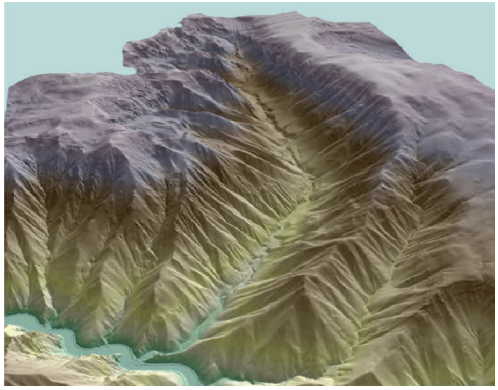
Restoring, Enhancing, and Sustaining Forests in California, Hawaii & the Pacific Islands

Plumas National Forest - Mt. Hough RD

LiDAR improves stream mapping in the Storrie Fire

Ask anyone who has worked within the footprint of the 2000 Storrie Fire and they will tell you that this rugged spot in the Feather River Canyon can be difficult to access. To overcome this obstacle, Forest Service managers have started using an alternative approach to data collection that reduces the need for field work in remote and potentially unsafe locations.

In 2009, the Plumas and Lassen National Forests acquired high-resolution Light Detection and Ranging (LiDAR) data for the Storrie Fire area. LiDAR is a type of remote sensing technology that uses pulses of laser light to create extremely accurate measurements of the ground, vegetation, and structures. Since their acquisition, these data have had a number of useful applications for the Storrie Fire Restoration effort; one of which has been to improve the accuracy of stream map.



Three dimensional LiDAR image showing the confluence of Chips Creek and the Feather River (©Watershed Science)

Why do we need accurate maps of streams?

Streams, and the riparian systems that they support, play a crucial role in ecosystem function. In addition to transporting water and sediment, streams provide valuable habitat for plants and animals in diverse aquatic and terrestrial communities. Management and restoration of these habitats is the focus of numerous projects identified in the Storrie Fire 10-year Restoration Plan. The importance of these ecosystems, as well as our increasing dependence upon mapping and Geographical Information Systems (GIS) for planning and analysis, makes accurate spatial information essential for effective restoration and resource management.

Figures showing the increased accuracy of the LiDAR-derived stream channels (depicted in blue) compared to the most current stream map, which is a subset of the National Hydrography dataset (NHD) (in orange)

Connection to Storrie Settlement: LiDAR data have been used to identify restoration opportunities within the Storrie Fire footprint, such as barriers to fish passage, landslides, and areas of natural post-fire tree regeneration. LiDAR data have also been used to ensure protection of sensitive cultural resources during implementation of restoration projects.

Funding: Storrie Fire Settlement ($64,687)

Cooperators: USDA Forest Service, Remote Sensing Applications Center (RSAC)

How were LiDAR data used?

The LiDAR data were first processed to generate a highly accurate map of the Storrie Fire terrain. Streams were then derived from this map, which is also called a bare earth model or Digital Elevation Model (DEM), using a series of automated algorithms, all of which are included in the Arc Hydro GIS software package.

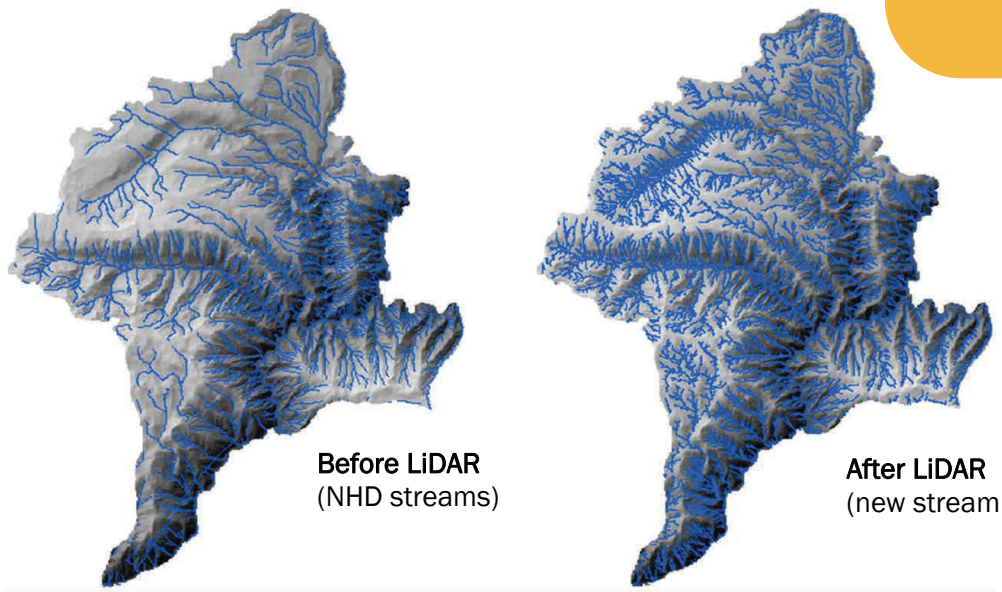
One of the primary outcomes from this project was the development of a step-by-step process for extracting stream channels from LiDAR data; this protocol is freely available upon request from the contact provided in the box below.

What were the results?

The stream network derived from the high resolution LiDAR data was much more accurate that the most current stream map, which is a subset of the National Hydrography Dataset (NHD). The LiDAR stream network consisted of more than 11,000 stream segments, which totaled over 800 linear miles (see Figure below). Compared to the NHD mapped streams, the LiDAR-derived streams had a greater number of tributaries, particularly in the flatter regions of the project area. They also had a greater degree of complexity and were more aligned with the topography of the landscape (see the Figures on the previous page). Portions of the stream network are currently being field verified to validate the accuracy of the modeled stream channels.

As part of the Storrie Fire restoration effort, LiDAR data have been used to identify:

- Cultural resources for protection
- Large barriers to fish passage
- Landslides
- Areas with natural regeneration of oak and conifer species



For more information on the Storrie Fire Restoration Projects, visit: www.fs.usda.gov/plumas, then scroll to "Features," and "Storrie Fire Restoration Project."

For more information on this project, contact: Michelle Coppoletta (530) 283-7822 or mcoppoletta@fs.fed.us

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