Project Summary
Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: LiDAR and Multispectral Image Acquisition and Mapping over 105 River Miles and Corresponding Floodplain within the Dinosaur National Monument

Discipline: Natural Resources
Type of Project: Technical Assistance
Funding Agency: National Park Service
Other Partners/Cooperators: Utah State University
Effective Dates: July 31, 2011 – June 30, 2012
Funding Amount: $82,916

Investigators and Agency Representative:

NPS Contact: Cheryl Jaworowski, Yellowstone Center for Resources, P.O. Box 168, Yellowstone National Park, WY 82190; 307-344-2208; cheryl_jaworowski@nps.gov.

Investigator: Joe Wheaton, Geomorphologist, Department of Watershed Science, Utah State University, 5210 Old Main Hill, Logan, UT 84322-5210. joe.wheaton@usu.edu, 435-797-2465

Abstract: The 2011 high magnitude, long duration streamflows on the Green and Yampa rivers have potential to mobilize sediment, erode geomorphic surfaces, scour banks, deposit sediments, remove trees, create surfaces for establishment of new trees, and create new secondary channels or back channels and fill others. These flows may produce spatially unique and variable patterns of erosion and scour, channel change, and sediment deposition throughout the 105 miles of river corridor within Dinosaur National Monument. And, not all stream reaches will be affected in similar ways, for example, canyon reaches may behave/respond differently from alluvial reaches. Thus it is critical to capture the effects of these flow events on a scale and across a geographic area that yields as much information as possible and a complete baseline data set of high resolution topography and vegetation condition.

One of the simplest and most efficient ways to capture the spatially variable disturbance footprint of these flow events along both the Green and Yampa river corridors throughout the entire park is with an airborne remote sensing system that utilizes both downward-looking Light Detection And Ranging (LiDAR) and multispectral image technology that can capture and define local channel conditions and vegetative cover along the banks and floodplains. In 2005 Utah State University - Center for Active Sensing and Imaging and the Remote Sensing Services Laboratory collected classified high-resolution multi-spectral imagery for selected reaches of the Green and Yampa rivers in Dinosaur National Monument. In 2008 and 2010 high resolution topography (LiDAR) was also collected. These reaches included a 3.9-km reach through Deerlodge Park, a 19-km reach through Yampa Canyon from Harding Hole downstream past Laddie Park, and a 10.4-km reach through Whirlpool Canyon on the Green River. To date, however, there is no complete LiDAR and multispectral image data set of all 105 miles of the Green and Yampa rivers through Dinosaur National Monument. The proposed work will process the 2010 data sets (including accuracy and change detection) and capture 2011 post-flood topography and vegetation for the entire park. The 2011 imagery will serve as a baseline data set for long-term monitoring against which future channel and vegetation change/response to this or subsequent flows or lack thereof will be gauged. This data set will also allow immediate comparison to the pre-flood LiDAR and multispectral imagery acquired in 2008 and 2010 for the selected reaches making it possible to generate maps of bank retreat, channel and vegetation change, and floodplain deposition/erosion.

Outcomes with Completion Dates: Final Report and full delivery of all products for all 105 miles of Green and Yampa Rivers and corresponding floodplain within DINO by May 31, 2012.

Keywords: Utah State University, Dinosaur National Monument, mapping, rivers, floodplains, LiDAR