SAFETY, MONETARY, AND ENVIRONMENTAL CONSIDERATIONS IN REPLACING FOOTBRIDGES WITH CABLEWAY INSTALLATIONS FOR PEAK-FLOW MONITORING OF SEDIMENT AND DISCHARGE IN THE OUACHITA MOUNTAINS, ARKANSAS

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Abstract Peak-flow discharges produced by Hurricane Gustav as it passed over the Ouachita Mountains of Arkansas during 1-4 September 2008 destroyed or damaged three footbridges used by the USDA Forest Service (FS) for high-flow sampling of sediment and discharge. High-flow sampling is required to measure sediment transport rates when they are at their highest values and when the majority of annual sediment and water yields are produced. Historically, footbridges have been used because these measurements must be made manually, and streamflow is too deep or swift to permit wading. However, footbridges can be problematic. To minimize costs, bridge elevation is often reduced to the bare minimum, making the failure risk fairly high. A cableway system is an alternative to a footbridge. A cableway system consists of a heavy wire cable suspended between two support posts installed on opposite streambanks. A traveling block is attached to the cable and is used to deploy a current meter or sediment sampler across the stream using a winch system to control and measure both lateral and vertical position of the instruments. Cableway systems were chosen by the FS to replace the destroyed and damaged footbridges for the following reasons:

• Decreased potential for structure or equipment loss or damage -- The only thing continuously exposed are the cables, and these can be suspended at a higher elevation above the stream than is usually practical with footbridges.

• Decreased potential for environmental impacts resulting from footbridge failure -- If the cableway were to fail, only the cable would fall into the stream; in contrast to a failed footbridge where most, if not all, of the bridge material would fall into and be transported by the stream.

• Increased safety for personnel -- Cableway systems are operated from the bank, and do not require personnel to be in or above the channel during high flows.

• Less expensive than footbridge -- Purchase and installation of a cableway system by the US Geological Survey was less than half the cost of a private-contractor installed footbridge.

To assess the environmental impact of installing a cableway system, the FS monitored total suspended solids concentrations during installation of a cableway system in the Ouachita National Forest. The results showed that while concentrations did increase during the required excavation work, they very quickly returned to baseline levels and appeared to be no different from those produced during installation of a footbridge, and well within the range produced by natural peak-flow events in the Ouachita Mountains.