

Verde Independent

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New technology helps SRP track river, stream flows, snowmelt, water depth

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If a picture is worth a thousand words, then nobody knows better than [Salt River Project](#)'s Lee Ester, manager of SRP's Water Measurement department.

Among other things, Ester's group is tasked with the important job of measuring river and stream flows across SRP's 13,000-square-foot watershed before the rain and melting snow is captured and stored in the reservoirs along the Salt and Verde rivers.

Those drops eventually wind up behind the seven dams operated and managed by SRP, which is the largest provider of water to the greater Phoenix metropolitan area.

An SRP employee since 1987, Ester has spent much of his career in search of new ways and technologies that make it easier, less expensive and, of course, better for water managers to track conventional water depth data. But even with the variety of rain gauges and other measuring equipment at his disposal, Ester has never come across a device to track the runoff from snowmelt and rainfall that also offered visual proof of a stream's flow or a snow-measuring station.

Until now.

Taking it into his own hands, Ester developed the SRP Flowtography technology in the spring of 2012. In addition to a catchy name, the technology is essentially a simple, inexpensive way of monitoring stream flow that uses both time-lapse cameras and in-stream visual staff gauges to provide a better understanding of the behavior of a stream, snow accumulation and overall watershed conditions.

"In the science of hydrology and in watershed management, monitoring and measurement, a picture is now worth more than words with Flowtography," said Ester, whose invention combines time-lapse image collection synchronized with the collection of conventional water depth, or stage data, in ephemeral Arizona streams that only exist for a short period following precipitation or snowmelt.

When the electronic data is collected, so too are the images from the Flowtography equipment on site. Back in the office, the conventional electronic data is processed for stage accuracy by consulting, comparing and verifying the images collected against the electronic data, which is especially useful in seasonal and flashy ephemeral stream events.

"Conventional water depth data collection methods require expensive equipment and infrastructure to be installed and maintained," said Ester. "Hydrologists and technicians carefully plan out the operation of the site, acquire the necessary instrumentation and complete the installation.

"When finished, the site is left to operate on its own with an expectation for accurate data, but accuracy is not always assured and only spot visits are possible to 'calibrate,' or make adjustments, to the data



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collected once back in the office. With Flowtography, we are collecting 35,000 photos a site per year, and those final images provide a highly needed source of 'secondary' information to ensure that stream events are correctly characterized."

Ester said SRP Flowtography has already been field tested for two years by his department, which designs and operates a variety of instrumentation such as telemetry and photo imagery, and is currently being utilized at several locations across the Salt and Verde watersheds as well as at various Four Forest Restoration Initiative (4FRI) sites to track watershed conditions in Arizona's forests.

4FRI is a collaborative effort to restore forest ecosystems on portions of four national forests -- Coconino, Kaibab, Apache-Sitgreaves and Tonto -- along the Mogollon Rim in northern Arizona.

Another prominent use of Flowtography is at the Big Chino Sub-basin Project, where SRP is partnering with Prescott and Prescott Valley to monitor surface flows along nine ephemeral reaches of streams and creek sections in the sub-basin of the [Verde River](#) Watershed.

Cameras and water-measurement equipment are being installed upstream and downstream and monitored at regular intervals at each location on the sub-basin, which stretches northwest from Paulden and encompasses 1,850 square miles.

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