



# Geospatial Tool for Instrumentation Inventory and Collection and Evaluation of Readings

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### Mission Issue

This project addresses the mission issue of managing water and water related resources with an outdated instrumentation data transmission procedure.

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### Problem

The problem this research is addressing is the fact that currently the process employed by Reclamation for taking dam instrument readings, transmission of the readings, and review by dam instrumentation personnel is a multi-day, multi-step, manual process that is at high risk for data entry errors and is inefficient.

### Solution

The current process is taking the instrument readings from the dam instruments in the field and using an outdated process to transmit them to the Data Acquisition and Management System (DAMS) where all the instrumentation readings are stored. This research project looked at using modern mobile devices and applications to collect and create a geospatial inventory of dam instruments. Beyond the inventory was the use of applications on mobile devices to populate a survey that can be tailored to each dam and used in the field with no internet. Survey users are also able to make comments, take pictures (of broken instruments etc for example), and use the interactive map in the survey to navigate to instruments. After all the instrument readings are entered into the survey it is submitted or uploaded through the cloud to ArcGIS Online (using an internet connection) where it is stored until it is submitted or taken by an instrumentation group employee for import into the DAMS. This process cuts out the use of fax machines, paper, and going back to a computer in the office (double entry) to enter the results where the probability for data entry error is higher.

*“Largely, Reclamations current set of procedures for collecting dam instrumentation readings are antiquated, inefficient, and easily allows for errors in the data.”*

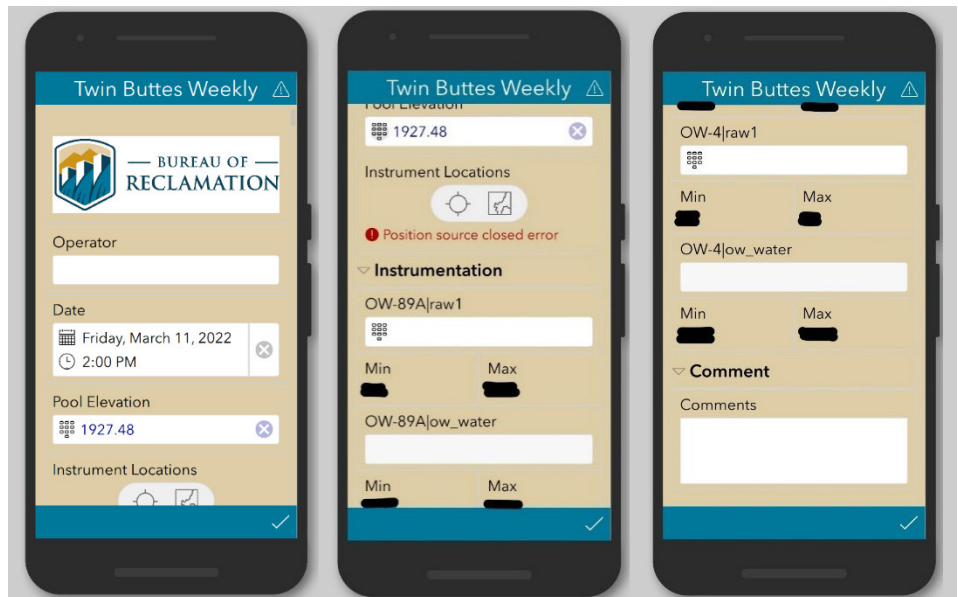
Paul Martin  
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### More Information

<https://www.usbr.gov/research/projects/detail.cfm?id=20020>

## Application and Results

In theory the project results can be applied to all dams that Reclamation manages, possibly including those dams managed via partnerships with other agencies. The field data collection of instrument readings using mobile applications modernizes the antiquated pen and paper/double entry process. Not only does it modernize the instrument data retrieval process, but it can also be used to determine if instruments are within performance parameters in real time while out in the field collecting the data. Two different applications were created. One application had the functionality to simply enter the dam instrument readings into it. The other application used instrument equations from those stored in DAMS within the survey data entry fields. This meant once a number was entered in the field of the survey for that instrument the survey would immediately show the user whether that number fell within the performance parameters of that dam instrument (see photos of this application above). No internet connection was required as the dam instrument equations were stored within the survey itself on the mobile device.



*Basic example of one of the survey applications created for this project. Survey scrolls down as you look left to right.*

## Future Plans

The project had a Return-on-Investment study performed for it in 2021/2022 that yielded promising cost savings results. These results are being reviewed and considered by other groups of people working on similar projects within Reclamation. There has not been a focused effort so far to implement this project Reclamation wide, but we feel this should be the case as this project has the potential to provide a direct positive impact to dam safety. We feel the next step would be a pilot project where it can be demonstrated that the survey results can be transmitted from AGOL into the DAMS, or perhaps in another more effective way.