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Geog 385 Report Document
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Well Canvass Field Form using ESRI Collector

PROJECT SUMMARY

The purpose of this project is to convert the USGS Well Canvass Form from paper to an electronic form. This was accomplished using the Collector App for data collection in the field, and a Web Map App for review in the office. As this is a proof-of-concept project, not every field on the Well Canvass Form was included in the Application. All USGS data included in this project are publically available.

PURPOSE

The paper USGS Well Canvass Form (see Appendix 1) is used to collect information about a data collection site during a field visit by one or more field staff. Information about the location, well, owner, and suitability of the well for sampling is written on the form along with photo numbers and descriptions of the photos. Typically many sites are canvassed during a week and the field forms and photos are handed off to staff for site creation into the National Water Information System (NWIS). Collecting information in an electronic format has been encouraged but the electronic field forms were required to be printed onto paper and stored in the official records files. As of October 2016, we are now allowed to keep official records in an electronic format. This project is a proof-of-concept project for using the Collector App to collect and document the information collected to establish a site in NWIS and sample a well.

DESCRIPTION

Data Development

Study Criteria

For the purposes of this project, Sacramento County and San Joaquin boundaries will stand in for normal basin boundaries. A typical study unit ranges over parts multiple counties, with about the same total area as the two chosen counties. Large parts of Sacramento and San Joaquin counties are included in the next actual study area.

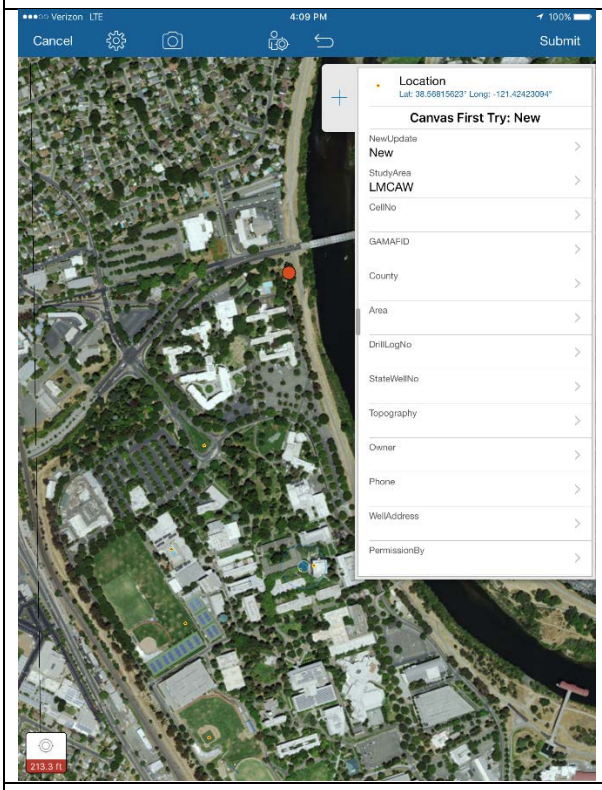
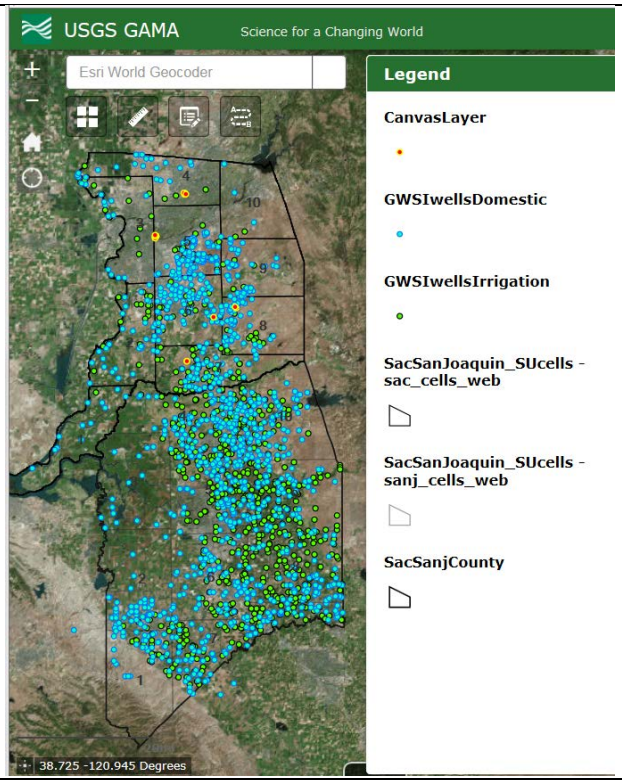
The study area is then divided into cells with a randomized equal-area algorithm (actually a little more complicated than that). Typically there are between 70 and 80 cells total in the study, for these purposes I requested that the counties have 10 cells each. Multiple wells in each cell may be canvassed. One well in each cell will be sampled.

There is a hierarchy of criteria to determine if a well is suitable for sampling for the particular study area. For this project, I have only used the wells that have already been established in NWIS. The target wells for the study are domestic wells. Occasionally, an irrigation well that is also used for domestic use is included in the study.

Data

For this project, feature layer services were created for County Boundaries (stand-in for study-unit boundaries), Study Unit Cells (generated), Domestic Wells (NWIS), Irrigation wells (NWIS), and an editable Canvas feature layers to collect new data. Beside the location information, the GWSI well layers also contain attributes useful for canvassing including Well Completion Report number, if on file, and the well depth.

Web application development

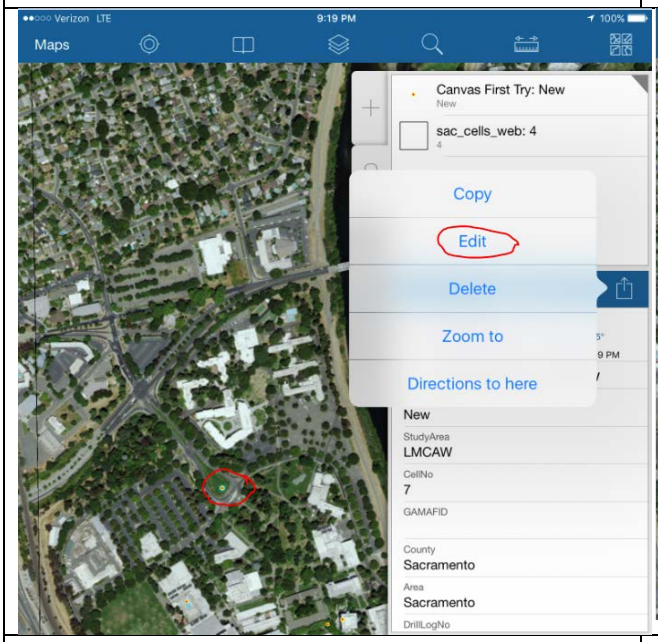
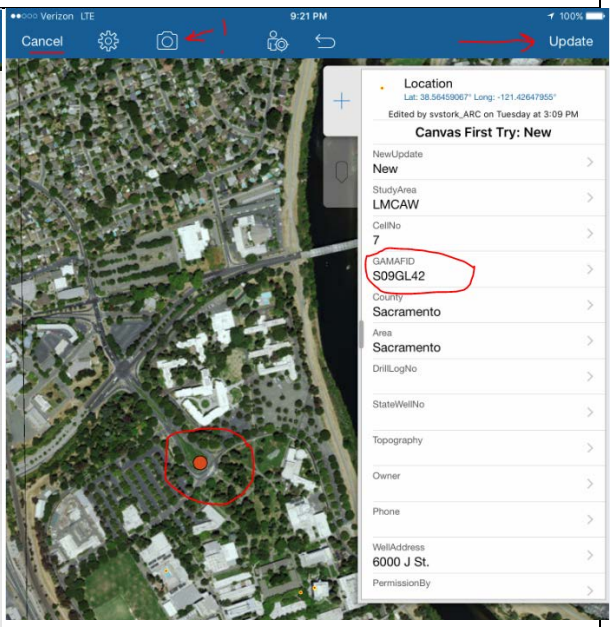
COLLECTOR APP WELL CANVASS FIELD FORM	WELL CANVASS FIELD FORM WEB MAP APP
	
Addition of a new well location to the Well Canvas Field Form. After submitting the new data point, it show up on the Web Map App within a few seconds.	Study Unit boundaries, layers, and widgets included the Well Canvass Field Form Web Map App.

The features were created in an Arc GIS for Desktop geodatabase on my office computer. Attribute domains were created for appropriate fields so drop-down lists would be available for the web services. The features were then shared as a service to AGOL. The Feature Access operations allowed were set to query for all layers except the CanvassLayer. The CanvassLayer Feature Access operations were set to Create, Sync, Delete, Query, and Update.

In AGOL, a Canvass Web Map was created and the shared feature layers, CanvassLayer, GWSIwellsDomestic, GWSIWellsIrrigation, SacSanJoaquin_SUcells, SacSanjCounty were added to the Web Map. The ESRI World Imagery was chosen as the basemap, but the user can change the basemap to any of the online ESRI basemaps as needed. Attachments must be enabled in the AGOL Canvass layer overview tab for photos of landuse, the well, and sample points.

Collector

Collector was installed on the iPad. After logging into AGOL, selecting the Canvass Web Map opens it in the Collector App for display and editing in the field. Adding a new well to the Canvass Layer or editing existing well information in Collector is relatively intuitive and easy.

Collector in Maps mode	Collector in Edit mode
	
Touching an existing well brings up the existing attribute information. The up-arrow symbol at the top of the pop-up list is easy to identify as a “do something with this data point” option.	After touching ‘Edit’, the app is now in Edit mode. The well information can be updated. Note that the options in Edit mode are different than the options in Maps mode. Now you can capture and attach a photo or another document.

Web Map Application

The Web Map Application was generated by creating a Web App from the Canvass Web Map using the Web App Builder. The banner was customized with the project logo. The Measure, Edit, and A to B directions widget were added to the Canvass Web Map App. The Web Map Application is primarily used in the office to track progress of staff in the field, transfer data to the office, and review data collected in the field.

DIFFICULTIES

Several other apps including, Survey123 and GeoForms were investigated before settling on the Collector App. While the format of Survey123 and GeoForms (although I didn't get GeoForms working) better fit the format of the existing paper canvass form, one cannot edit data in the Canvass layer after it has been entered. At the present time, this issue is sufficient to narrow the choice of formats to the Collector App. Hopefully the functionality of the various app formats will evolve over time while retaining the ease of set-up and use.

The option to take a photo in an editable layer in collector only shows up when attachments are enabled in the AGOL layer overview tab.

Using the iPad photo 'Markup' tool to attribute a photo does not work with AGOL. The Markup tool creates a 'sidecar' file which is not attached to the record in AGOL. It looks like a photo metadata editor like Investigator will allow you to attach a photo with a caption stored in the actual header of the photo, but I didn't check that yet.

Sharing feature layer services from ArcGIS for Desktop to AGOL was problematic at times. There were intermittent periods of time, up to 3 hours, often in the late afternoon where it was not possible to successfully share data. As I am new to these services, this was very perplexing and I was unable to discern whether I was doing something wrong or whether the requested services were not working on the AGOL server. After much trial, it was determined that the problem was on the AGOL side.

Identify pop-up windows switch between mobile and normal based on the browser window scale. This was very irritating and took a few minutes to run down. Trial and error using my collector app on the iPad showed it switches to the mobile format when the browser window scale is >125%.

The labels for the SU grid cells show up on the Web Map, the Web Map Application, but not in Collector. I have bit is not possible to enable labels in Collector.

If you add attach a photo or document in the Web Map Application, it will name it whatever you have named the attachment. If you add a photo from the iPad, whether directly through the Collector App or from the photo library on the iPad, it names it Photo1, Photo2. I haven't figured out how to change the name. Perusal of the internet leads me to believe that is not possible at this time.

FINAL WEB APPLICATION AND SERVICES

This is totally cool! An out of the box two-way web service that is easy to set up, easy to use, and it works (most of the time)!

In Collector, using the single column + list is a bit unwieldy, even for the shortened list of attributes in this proof-of-concept project. On the drop-down for the attribute, it would be better if you didn't have to also touch the 'Done' button. Having the microphone as an option to populate the fields instead of the only the keyboard works really well most of the time. I see this as being very useful for our field personnel and they are already eager to use it in the field.

A larger issue is the management of the photos. ESRI states they did not envision AGOL as a photo repository. I understand the management of photos is a really big issue (perhaps solved by Google) and their reluctance to jump into the topic, but some more utility in the Collector app for naming and editing the photo metadata should be developed.

Unfortunately, we are not cleared to use AGOL for data with Publically Identifiable Information (PII). Since the owner information and site details are necessary information for us to collect, we cannot use AGOL as a replacement for a paper canvass field form at the current time. I am in the process of setting up Portal behind our firewall and will be working to see if I can get the same utility as AGOL.

The Web Map App works very well hand-in-hand with the Collector App for reviewing and editing in the office.

After Portal is functional, we can also make use of a couple of the datasets that include PII: the DWR Well Log Database and the SWRCB Domestic Well Study wells. The lead canvassing hydrologist would also like to be able to generate a report from the information in the canvass form for the sampling crew without having to transcribe her notes from the canvass form to an excel spreadsheet as she does currently. Since the information collected on the canvass form is used to establish a site in NWIS, it would be nice to have some of the location-based fields auto-populate in the application. We do have a developer who could probably do this when we get to that level of sophistication. I can see a future version of Collector becoming our general electronic field form platform within the next couple of years.