Mobile Data Collection, QA/QC, Analysis, and Reporting

Leveraging Esri’s online and desktop tools for data workflow

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USGS Ecologist, Forest and Rangeland Ecosystem Science Center, Boise, ID

Columbia River Inter-Tribal Fish Commission and Inter-Tribal Monitoring Data Presentation – August 3rd, 2020
• Is there a good, easy geoprocessing tool for creating reports for export in pdf or word?
  • They allow you to do this in the Survey 123 web app, why don’t they have it for other GIS Web Applications?
    Reporting Tool YES! Easy and good? ehhhhhhhh

• Can we set up forms as a grid?
  • We work up multiple fish at once, collecting all lengths at once, then move on to the next data field
    Kind of, there are other, non-Esri options out there

• How do we move from data collection forms (paper, regional electronic data capture, etc.) into Survey123?
  • The dos and don’ts, tips on planning the move, large issues to overcome, etc.
    Do I know what not to do!

• Did you check out the 2020 Esri's Virtual User Conference?
  • Did you learn anything new about Survey123? What are some of the main features available?
    Yes!

*Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. government.
Example Survey Report

Site, Date, and Location Information

Recorder: $[RecorderName]  Handler: $[HandlerName]  Date: $[SurveyDate]

Site Location

Site Location: $[SiteLocation] (size:300:250)

Species Photo

Species Photo: $[SpeciesPhoto] (size:300:250)

Species Information

SubOrder - $[SubOrder]
Species - $[Species]
Disposition - $[Disposition]
Sex - $[Sex]
SVL (cm) - $[SVL_cm]

Tare Bag Weight (g) - $[TareBagWeight_g]
Weight (g) - $[Weight_g]
Actual Weight (g) - $[ActualWeight_g] - $[TareBagWeight_g]
PIT Tag - $[PITTag]
Blood Taken - $[BloodCollected]
Tissue Taken - $[TissueCollected]

Site Location

Species Photo

Species Information

SubOrder - Snake
Species - Rattlesnake
Disposition - Released
Sex - Male
SVL (cm) - 69

Tare Bag Weight (g) - 120
Weight (g) - 280
Actual Weight (g) - 160
PIT Tag - 980001026301391
Blood Taken - No
Tissue Taken - Yes

Site Location

Species Photo
### CRP Fields Sampled 2016

**Northwest CRP Records Selected:**

\( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{stats: count OBJECTID}$} \)

**Northwest CRP Records Sampled:**

\( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $Selected\_Sampled$ | stats: count OBJECTID}} \)

**All CRP Records Selected:**

\( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $1=1\_Important$ | stats: count OBJECTID}} \)

**All CRP Records Sampled:**

\( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $1=1\_Important$ | Sampled: $Sampled\_Important$ | stats: count OBJECTID}} \)

**Idaho Records Sampled:**

\( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $State=ID$ and Sampled: $Sampled$ | stats: count, State}} \)

| Sampled Field ID: 01 | \( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $State=ID$ and Sampled= $Sampled$ and CP\_Code=1 \_Important | stats: count, State}} \) out of \( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $State=ID$ and CP\_Code=1 \_Important}} \) total |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sampled Field ID: 02 | \( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $State=ID$ and Sampled= $Sampled$ and CP\_Code=2 \_Important | stats: count, State}} \) out of \( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $State=ID$ and CP\_Code=2 \_Important}} \) total |
| Sampled Field ID: 10 | \( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $State=ID$ and Sampled= $Sampled$ and CP\_Code=10 \_Important | stats: count, State}} \) out of \( \text{$CRP\_2016\_Selected\_Fields\_Polygon | \text{where: $State=ID$ and CP\_Code=10 \_Important}} \) total |

**Results:**

- **Northwest CRP Records Selected:** 281
- **Northwest CRP Records Sampled:** 221
- **All CRP Records Selected:** 2734
- **All CRP Records Sampled:** 1500
- **Idaho Records Sampled:** 221
- **Oregon Records Sampled:** 111

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*Preliminary Information - Subject to Revision. Not for Citation or Distribution.*
Survey123 reports using non-Survey123 data
ArcGIS Pro/ArcMap Feature Report/Summary Report

*Preliminary Information-Subject to Revision. Not for Citation or Distribution.*
# Forms as a Grid

**Survey123**

<table>
<thead>
<tr>
<th>Fish Species Information</th>
<th>Pit Tag Species 1</th>
<th>Pit Tag Species 2</th>
<th>Pit Tag Species 3</th>
<th>Pit Tag Species 4</th>
<th>Pit Tag Species 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Species 1</td>
<td>Salmon</td>
<td>Salmon</td>
<td></td>
<td>Bass</td>
<td></td>
</tr>
<tr>
<td>Fish Species 2</td>
<td>Salmon</td>
<td>Pit Tag Species 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish Species 3</td>
<td></td>
<td></td>
<td>Fish Species 3</td>
<td>Bass</td>
<td></td>
</tr>
<tr>
<td>Fish Species 4</td>
<td>Bluegill</td>
<td>Pit Tag Species 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish Species 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Salmon</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Fish 1 Length (mm)</th>
<th>Fish 2 Length (mm)</th>
<th>Fish 3 Length (mm)</th>
<th>Fish 4 Length (mm)</th>
<th>Fish 5 Length (mm)</th>
<th>Fish 1 Mass (g)</th>
<th>Fish 2 Mass (g)</th>
<th>Fish 3 Mass (g)</th>
<th>Fish 4 Mass (g)</th>
<th>Fish 5 Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmon 1234</td>
<td>689</td>
<td>750</td>
<td>337</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>150</td>
</tr>
</tbody>
</table>

Source: USGS
## FORMS AS A GRID

### Not a Great Way to Store Data

#### Survey123

<table>
<thead>
<tr>
<th>id</th>
<th>Fish</th>
<th>PITTag</th>
<th>Length</th>
<th>Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Salmon</td>
<td>1234</td>
<td>689</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Salmon</td>
<td>3568</td>
<td>874</td>
<td>112</td>
</tr>
<tr>
<td>3</td>
<td>Bass</td>
<td>235</td>
<td>750</td>
<td>234</td>
</tr>
<tr>
<td>4</td>
<td>Bluegill</td>
<td>58</td>
<td>99876</td>
<td>387</td>
</tr>
<tr>
<td>5</td>
<td>Salmon</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### USGS

<table>
<thead>
<tr>
<th>id</th>
<th>Fish</th>
<th>PITTag</th>
<th>Length</th>
<th>Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Salmon</td>
<td>1234</td>
<td>689</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Salmon</td>
<td>235</td>
<td>750</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bass</td>
<td>337</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bluegill</td>
<td>10</td>
<td>99876</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Salmon</td>
<td>150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Survey123 - Ideally we want stacked repeats
**FORMS AS A GRID**

**Other Options – Excel**
- Macro enabled – Full Windows Only
- Standard Excel – Any device

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**Light Version**

| Tag ID        | Date Scanned | Year Scanned | Month Scanned | Day Scanned | Site   | Ordinal | First Capture Date This Year | First Capture Site This Year | Previous Year | Previous Year's Site | Recap M(0) R(1) | Recap M(0) R(1) | Sex F(0) M(1) | Weight g | Tare g | SVL mm | Notes |
|---------------|--------------|--------------|---------------|-------------|--------|---------|-------------------------------|-----------------------------|---------------|---------------------|----------------|----------------|---------------|-----------|--------|--------|-------|-------|
| 124.00000000000000 | 10/8/19 14:11:49 | 2019 | 10 | 282 | Test | | | | | | | | | | | | | | |
| 125.00000000000000 | 10/8/19 14:12:17 | 2019 | 10 | 282 | Test | | | | | | | | | | | | | | |
| 345.00000000000000 | 10/9/19 6:44:50 | 2019 | 10 | 282 | Test | | | | | | | | | | | | | | |
| 456.00000000000000 | 10/9/19 7:08:42 | 2019 | 10 | 282 | Check | | | | | | | | | | | | | | |
| 599.00000000000000 | 10/9/19 7:08:49 | 2019 | 10 | 282 | Check | | | | | | | | | | | | | | |
| 124.00000000000000 | 10/9/19 7:15:33 | 2019 | 10 | 282 | Check | | 10/8/19 14:11:49 | Test | | | | | | | | | | |
| 124.00000000000000 | 10/9/19 9:06:33 | 2019 | 10 | 282 | Check | | 10/8/19 14:11:49 | Test | | | | | | | | | | |
| 985.170001775792 | 10/9/19 12:23:43 | 2019 | 10 | 283 | Check | | | | | | | | | | | | | | |

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• Never be afraid of failure
• This will take time, plan for it
• Procrastination + Panic = Disaster
• Expect mistakes and errors
  • From the project lead, field crew, and designer
  • Take advantage of field validation, relevant fields, required fields, calculations, and select lists whenever possible
• Google is my best friend
  • Whatever problem you have, someone has had it before you and posted the code up on the web
• I listen to both the experts and field crews
  • You can create the form, let the experts tell you how to design it

• Reduce, Reuse, Recycle
  • Copy/Paste is my favorite invention ever

• Plan and check your domains/choices

• Never make changes the morning of

• Have a paper notebook and backup form
ESRI USER CONFERENCE HIGHLIGHTS

• Watch the 1st Plenary Session
  • It’s free!
  • The Raster Suitability Tool (coming soon) could change how we do restoration and site selection
• Watch the 1st plenary session
  • It’s free and jaw dropping
  • The Raster Suitability Tool (coming soon) could change how we do restoration and site selection

• Esri continues to improve...everything
COOL STUFF TO SHOW YOU

https://community.esri.com/videos/6246

Survey123

- Organizing your survey
  - Pages
  - Grids
  - Collapsed Groups
  - Dynamic Labels
COOL STUFF TO SHOW YOU
https://community.esri.com/videos/6246

Survey123

- Organizing your survey
  - Pages
  - Grids
  - Collapsed Groups
  - Dynamic Labels

![Survey123 Diagram](image-url)
Survey123

- Organizing your survey
  - Pages
  - Grids
  - Collapsed Groups
  - Dynamic Labels

https://community.esri.com/videos/6246
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https://community.esri.com/videos/6246
Survey123

- Organizing your survey
- Pages
- Grids
- **Collapsed Groups**
- Dynamic Labels

https://community.esri.com/videos/6246
Survey123

- Organizing your survey
  - Pages
  - Grids
  - Collapsed Groups
  - Dynamic Labels
Survey123

- Identify the computer
COOL STUFF TO SHOW YOU

https://community.esri.com/videos/6246

Survey123

- Identify the computer

<table>
<thead>
<tr>
<th>A</th>
<th>type</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>begin group</td>
<td>PolyExampleStart</td>
<td>Polygon Map</td>
</tr>
<tr>
<td>3</td>
<td>username</td>
<td>UserName</td>
<td>User Name</td>
</tr>
<tr>
<td>4</td>
<td>text</td>
<td>VisibleUsername</td>
<td>User Name</td>
</tr>
<tr>
<td>5</td>
<td>deviceID</td>
<td>DeviceID</td>
<td>Device ID</td>
</tr>
<tr>
<td>6</td>
<td>text</td>
<td>VisibleDeviceID</td>
<td>Device ID</td>
</tr>
<tr>
<td>7</td>
<td>text</td>
<td>ComputerName</td>
<td>Computer Name</td>
</tr>
<tr>
<td>8</td>
<td>email</td>
<td>UserEmail</td>
<td>User Email</td>
</tr>
<tr>
<td>9</td>
<td>text</td>
<td>VisibleEmail</td>
<td>User Email</td>
</tr>
</tbody>
</table>

User Name
jwelty_USGS

Device ID
0eaa9a2a167a497eb7b9af51fda0abf7

Computer Name
Flicker

User Email
jwelty@usgs.gov
Survey123

Points, Lines, and Polygons!

https://community.esri.com/videos/6246
Survey123
• Interactive images
function runFSQuery(ID, Token) {
    var xmlhttp = new XMLHttpRequest();
    var token = Token
    var url = "https://services.arcgis.com/v01gqwM5QqNysAAi/arcgis/rest/services/SeedSpecies/FeatureServer/0/
    +"query?where=LocationRow+%3D+%27" + ID + "%27&objectIds=&time=&resultType=none&outFields=Barcode%2C+CommonName%2C+LocationRow&returnH
    idenFields=false&returnIdsOnly=false&returnUniqueIdsOnly=false&returnCountOnly=false&returnDistinctValues=false&cacheHint=false&orderByFields=&groupByFieldsForStat
    istics=&outStatistics=&having=&resultOffset=&resultRecordCount=&sqlFormat=none&f=json" + "+" + token
    xmlhttp.open("GET",url,false);
    xmlhttp.send();
    if (xmlhttp.status == 200) {
        return "Error";
    } else {
        var response = xmlhttp.responseText;
        if (response != null) {
            return response;
        } else {
            if (response == null) {
                return "Error";
            } else {
                return "Error";
            }
        }
    }
}
## Cool Stuff to Show You

**Collector**

<table>
<thead>
<tr>
<th>Collector (new one)</th>
<th>Collector Classic (old one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Android and iOS</td>
<td>Android, iOS, and Windows</td>
</tr>
<tr>
<td><strong>Web map labels work!</strong></td>
<td>No web map labels</td>
</tr>
<tr>
<td>Multiple download areas</td>
<td>One download area</td>
</tr>
<tr>
<td>• Predefined and on-the-fly</td>
<td></td>
</tr>
<tr>
<td>Compass feature to location widget</td>
<td>Who knows which way you’re going</td>
</tr>
<tr>
<td>Modem interface</td>
<td>Clunky interface</td>
</tr>
<tr>
<td>More layer types supported</td>
<td>Less layer types supported</td>
</tr>
</tbody>
</table>
COOL STUFF TO SHOW YOU

Field Maps

- Workforce
- Navigator
- Explorer
- Collector
- Tracker

Field Maps (Beta)

USGS
COOL STUFF TO SHOW YOU

High Accuracy GPS


Tips from reading the documents
• Please read the documentation carefully

Tips from folks who’ve used them
• They generally work great when paired properly
• Collect the GPS metadata questions
• Be patient while acquiring a GPS location
• Set the GPS accuracy to the proper setting
Map Viewer Beta

COOL STUFF TO SHOW YOU

Clustering
Tobyeb Fitrag Captures 2019

If you change the layer's drawing style, any customization you made to the pop-up or label will not be retained and it will revert back to the default. Learn more.

Enable clustering

Cluster radius

Low

High

Size range

Min

Max

Cluster label

Cluster pop-ups

Cluster attributes
<table>
<thead>
<tr>
<th>What are you taking a picture of?</th>
<th>Specify other.</th>
<th>Pole / landscape Photo Description</th>
<th>Mortality Comments</th>
<th>Site Comments</th>
<th>Carcass Identification Number</th>
<th>LabSpeciesIdentified</th>
<th>LabComments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole</td>
<td></td>
<td>head was seperated from body</td>
<td></td>
<td>road-20m fencing-25m</td>
<td>JV-060520-NES-01</td>
<td>Golden Eagle</td>
<td></td>
</tr>
<tr>
<td>Pole</td>
<td></td>
<td>little baby bird</td>
<td></td>
<td>road-5m fencing-15m</td>
<td>JV-060520-NES-02</td>
<td>Kangaroo Rat, suspect</td>
<td></td>
</tr>
<tr>
<td>Pole</td>
<td></td>
<td></td>
<td></td>
<td>road-15m fencing-20m</td>
<td>JV-060520-NES-03</td>
<td>Jackrabbit</td>
<td></td>
</tr>
<tr>
<td>Pole</td>
<td></td>
<td></td>
<td></td>
<td>road 6m away</td>
<td>JV-040320-NES-01</td>
<td>Common Raven, suspect</td>
<td>Single primary feather, color and length match CORA</td>
</tr>
<tr>
<td>Pole</td>
<td></td>
<td></td>
<td></td>
<td>road 45m fencing 38</td>
<td>JV-061220-NES-01</td>
<td>Jackrabbit</td>
<td></td>
</tr>
<tr>
<td>Pole</td>
<td></td>
<td></td>
<td></td>
<td>Fence 7 meters away. Road 35 meters away.</td>
<td>JV-061220-SJP-03</td>
<td>Jackrabbit</td>
<td></td>
</tr>
</tbody>
</table>

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ArcGIS Pro

- So many tools
- Access AGOL layers
- Graphing Capabilities
Design your own

- App Studio (desktop)
- Python (desktop)
- Developers (web)
- Solutions (web)

Analyze and Share your data

- Insights (similar to Tableau or Power BI)
- Operations Dashboard
- StoryMaps
PIT Tag Direct to Android

GetBlue Bluetooth Reader, Demo
TEC-IT • Communication
_installed

GetBlue Data Acquisition Tool
TEC-IT • Productivity
4.3 ★ 1K+ $18.99
QUESTIONS?

J WELTY@USGS.GOV

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Survey123

- Add Basemaps
  - Via AGOL
  - Direct Download
COOL STUFF TO SHOW YOU

https://community.esri.com/videos/6246

Survey123

- Add Basemaps (MMPK, Tile map package, or Vector map)
  - Via AGOL
  - Direct Download
Quick Capture

- Rapid data collection
- Big button
- Point, line, polygon locations
- Records line walked
IT'S ALL CONNECTED