Collecting Perishable Data with ArcGIS Online

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City of Salem

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Presentation Outline

Part 1 - Setup use case

- Purpose of the app
- Description of the data

Part 2

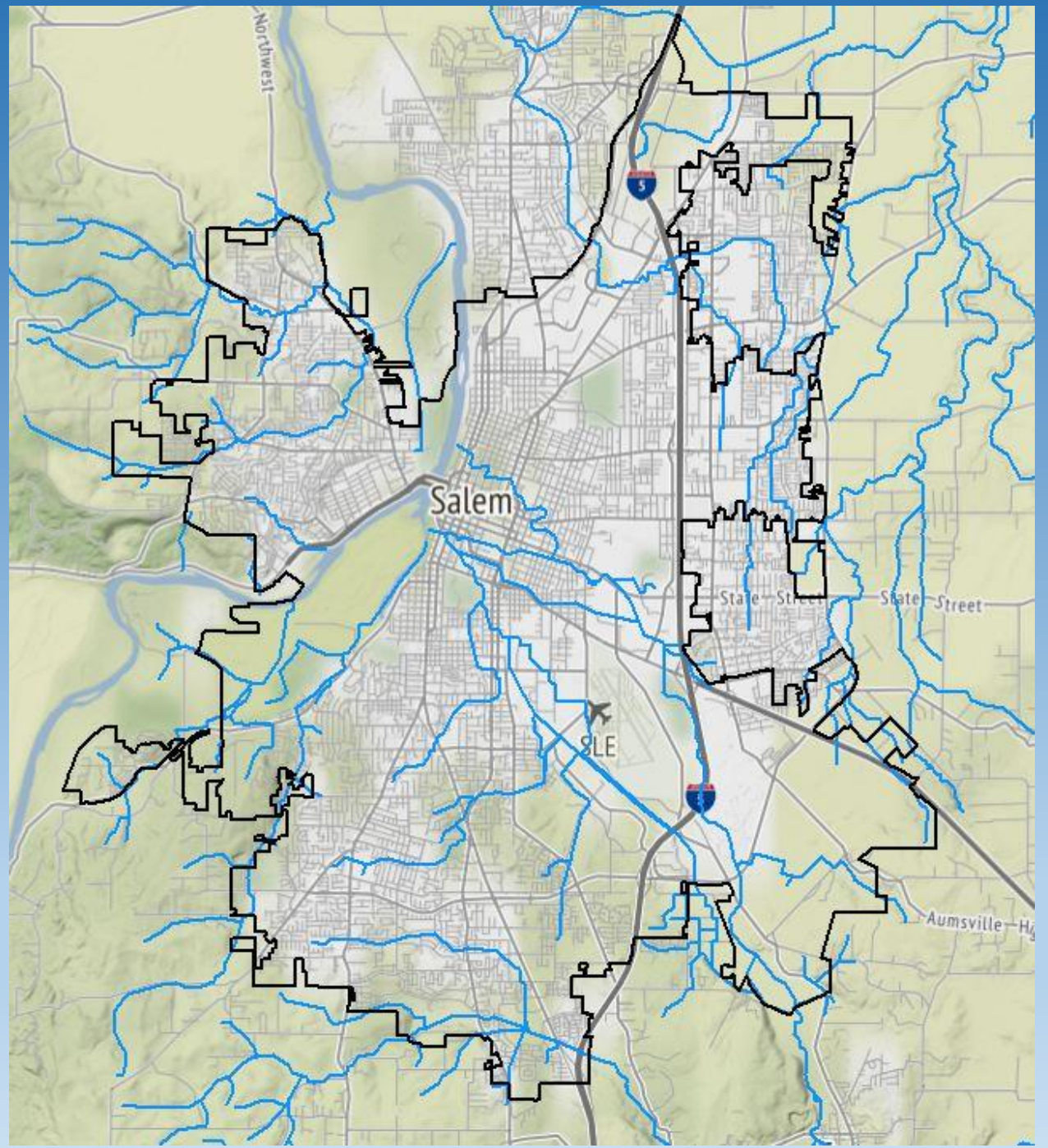
- Explain Application Structure and use issues
- Improved usability with Arcade and ArcGIS Online

Demo

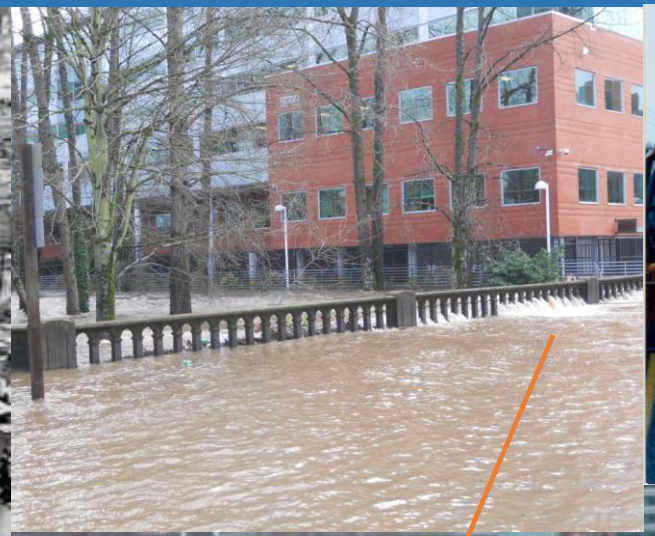
- Alternative data model: Survey123, Custom urls, Microsoft Flow

Part One – Use Case Background

- 40 inches of rain per year
- 90 miles of streams
- History of flooding



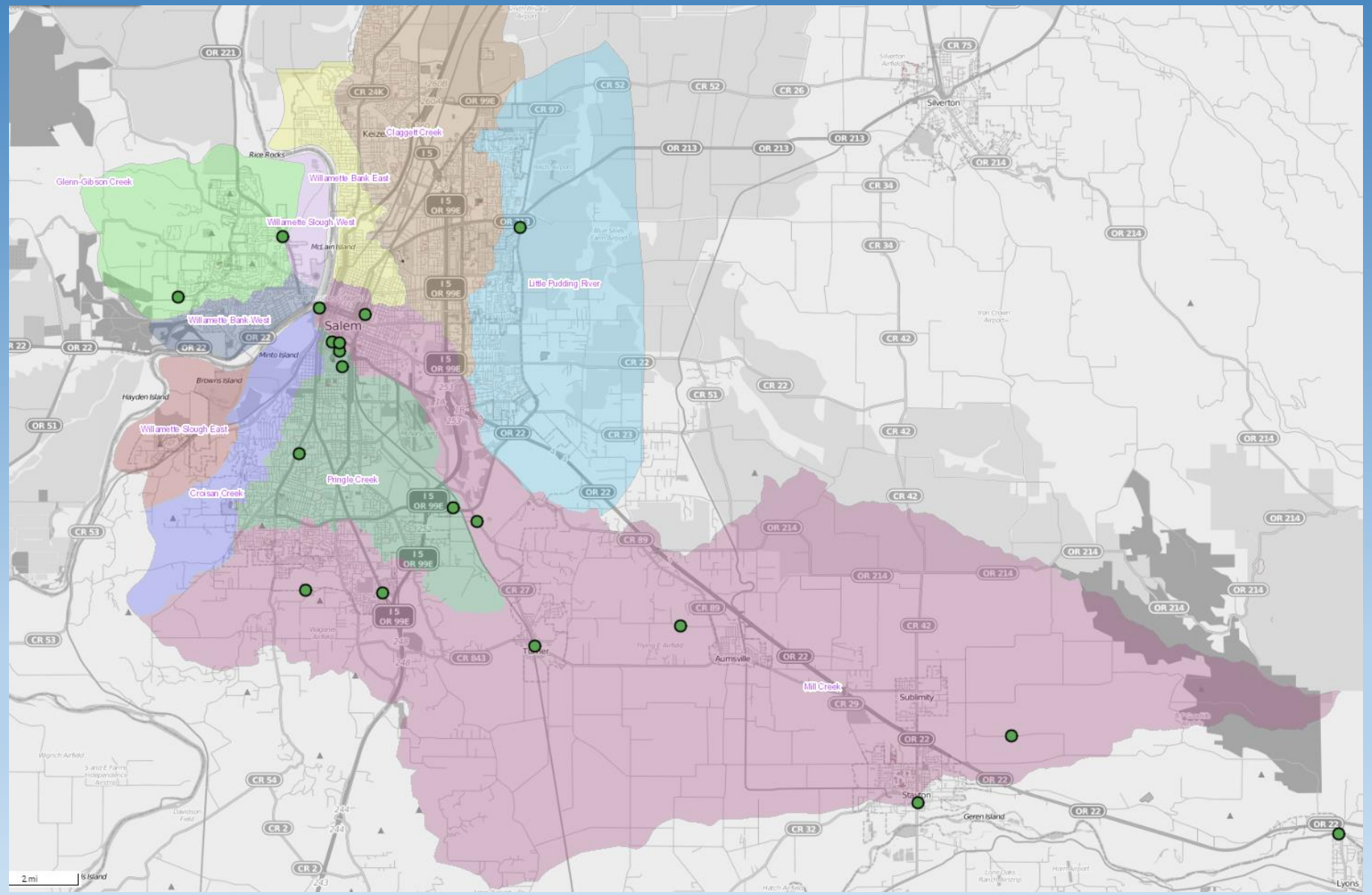

1960




1996

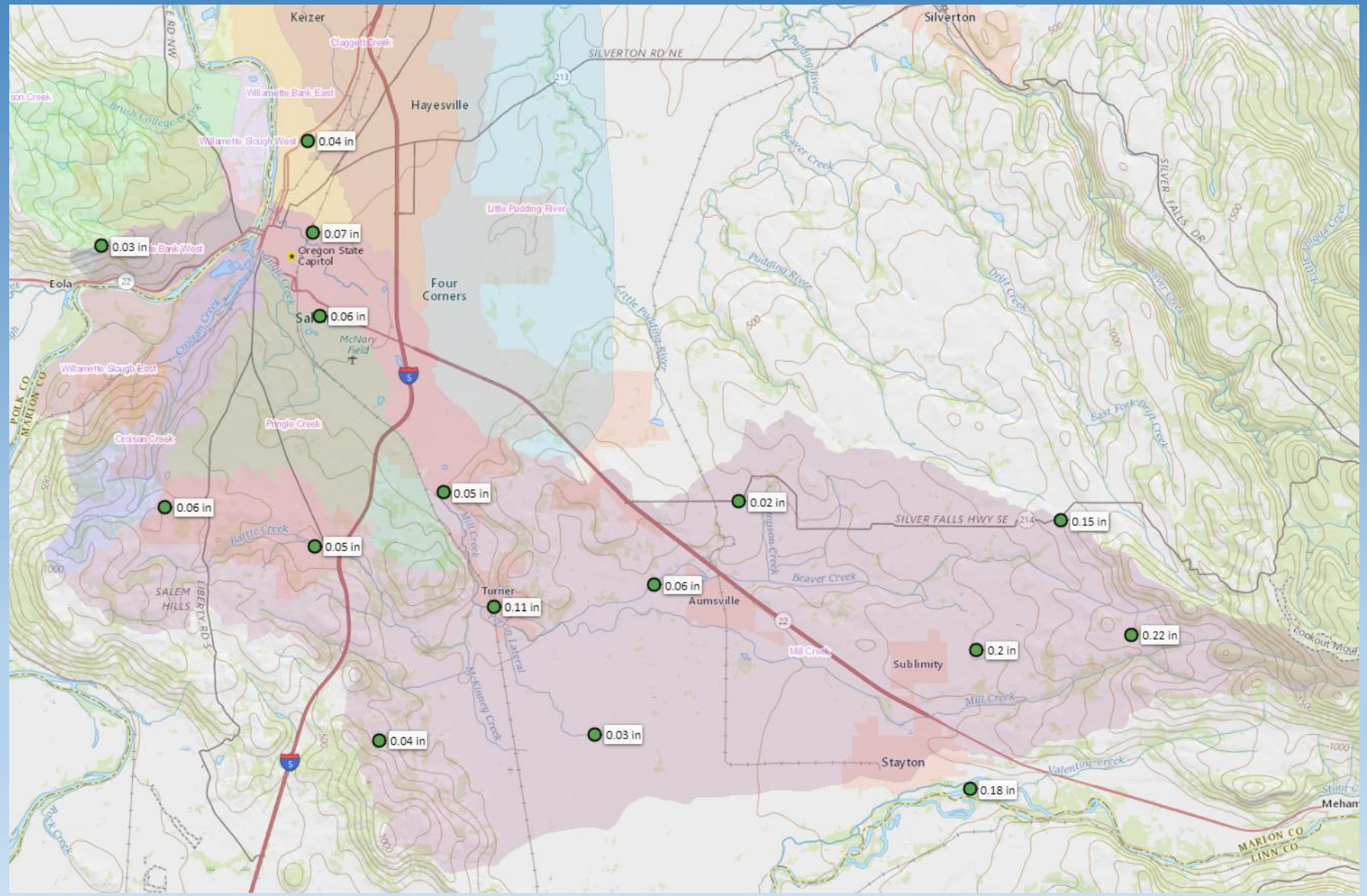

2012

Flood Warning System



- 17 real-time stream gauges
- Located throughout city and Mill Creek Watershed

Flood Warning System Cont'd



- 16 real-time rain gauges
- Located throughout city and Mill Creek Watershed

Hydrologic Model

```
"2015-12-13 01:15:00",.04,.02,.03,.01,0,.01,0,.02
"2015-12-13 01:30:00",0,0,.02,.02,0,0,.02,.03
"2015-12-13 01:45:00",.02,.03,.01,.04,0,.01,0,.02
"2015-12-13 02:00:00",.02,.04,.02,.02,0,.01,.01,.01
"2015-12-13 02:15:00",.04,.05,.02,.02,.01,.05,.02,.02
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"2015-12-13 02:45:00",0,0,.01,.04,0,0,.02,.02
"2015-12-13 03:00:00",0,.01,0,.01,.01,0,0,.01
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"2015-12-13 03:45:00",0,.01,0,0,.02,.01,.01,0
"2015-12-13 04:00:00",.02,.02,.01,0,.03,.01,.01,.01
"2015-12-13 04:15:00",.03,.04,.02,.01,.11,.01,.02,.01
"2015-12-13 04:30:00",.02,.02,.02,.01,.09,.02,.02,.02
"2015-12-13 04:45:00",0,.02,.01,.01,.03,.01,.01,.01
"2015-12-13 05:00:00",.01,.03,.02,.01,.04,.01,.01,.01
"2015-12-13 05:15:00",.03,.02,.01,.02,.03,.02,.02,.01
"2015-12-13 05:30:00",0,.01,.01,.01,.01,.01,.01,.02
"2015-12-13 05:45:00",.01,0,.01,.01,.02,.01,0,0
"2015-12-13 06:00:00",0,.01,.01,0,.01,.01,.01,.01
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"2015-12-13 08:00:00",0,0,0,.01,.01,0,0,0
```
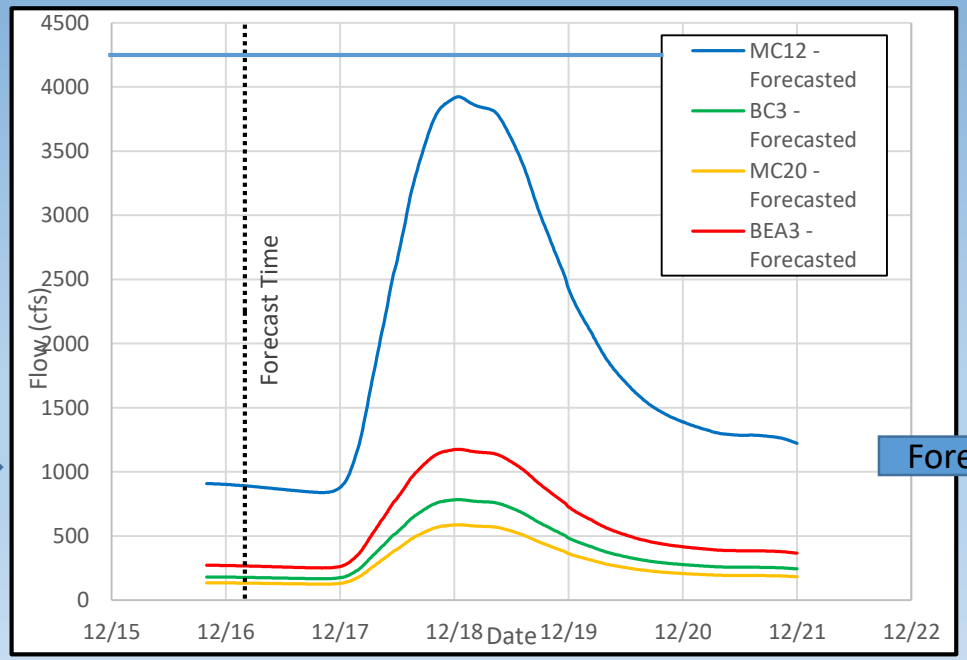
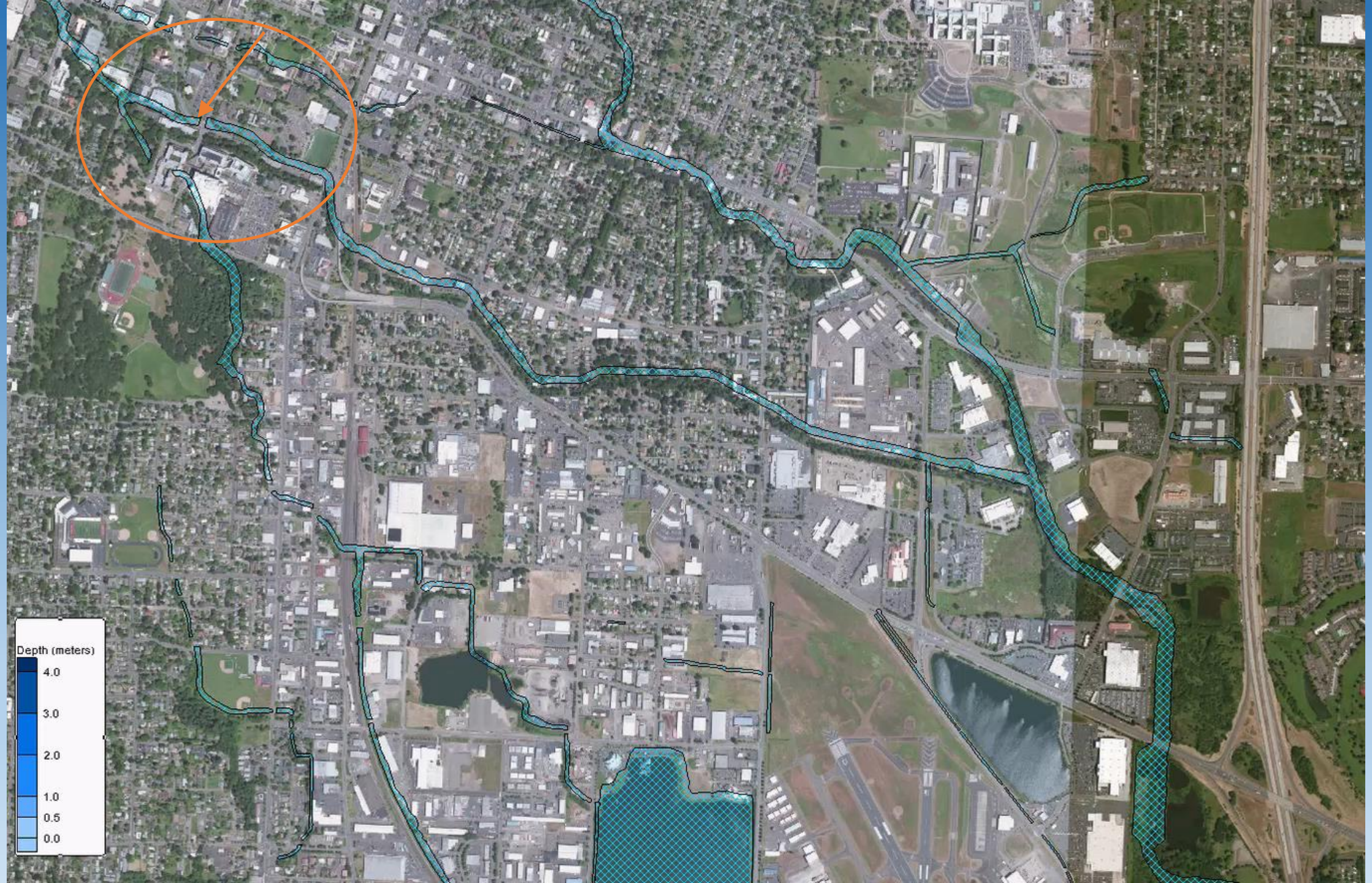

HEC HMS Model



Forecast inundation

Projected rainfall, ground saturation, snow conditions


Depth (meters)
4.0
3.0
2.0
1.0
0.5
0.0

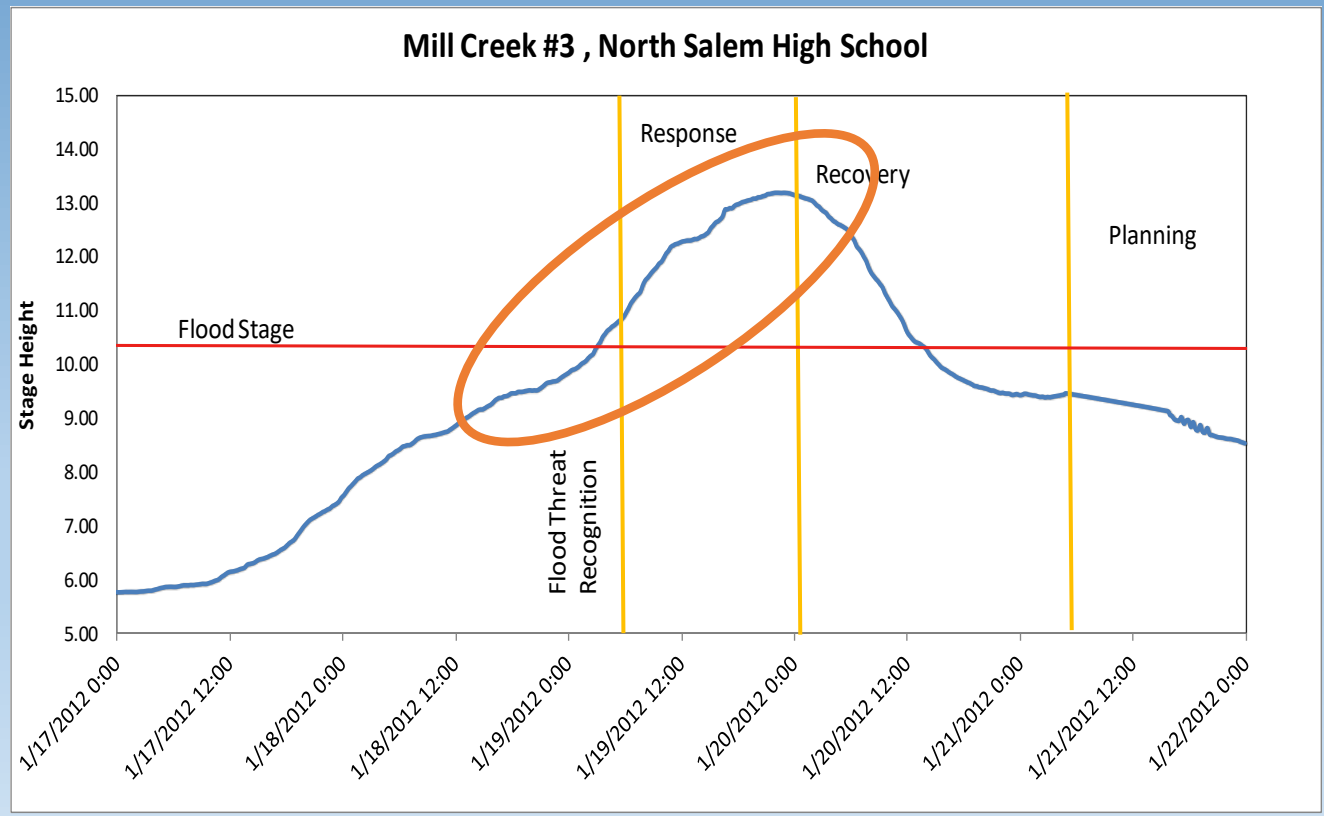
What is Perishable Data?

Documented observations of phenomena that are subject to rapid change and/or are useful for a limited time

- Temporally significant
- Must be collected quickly to be of use

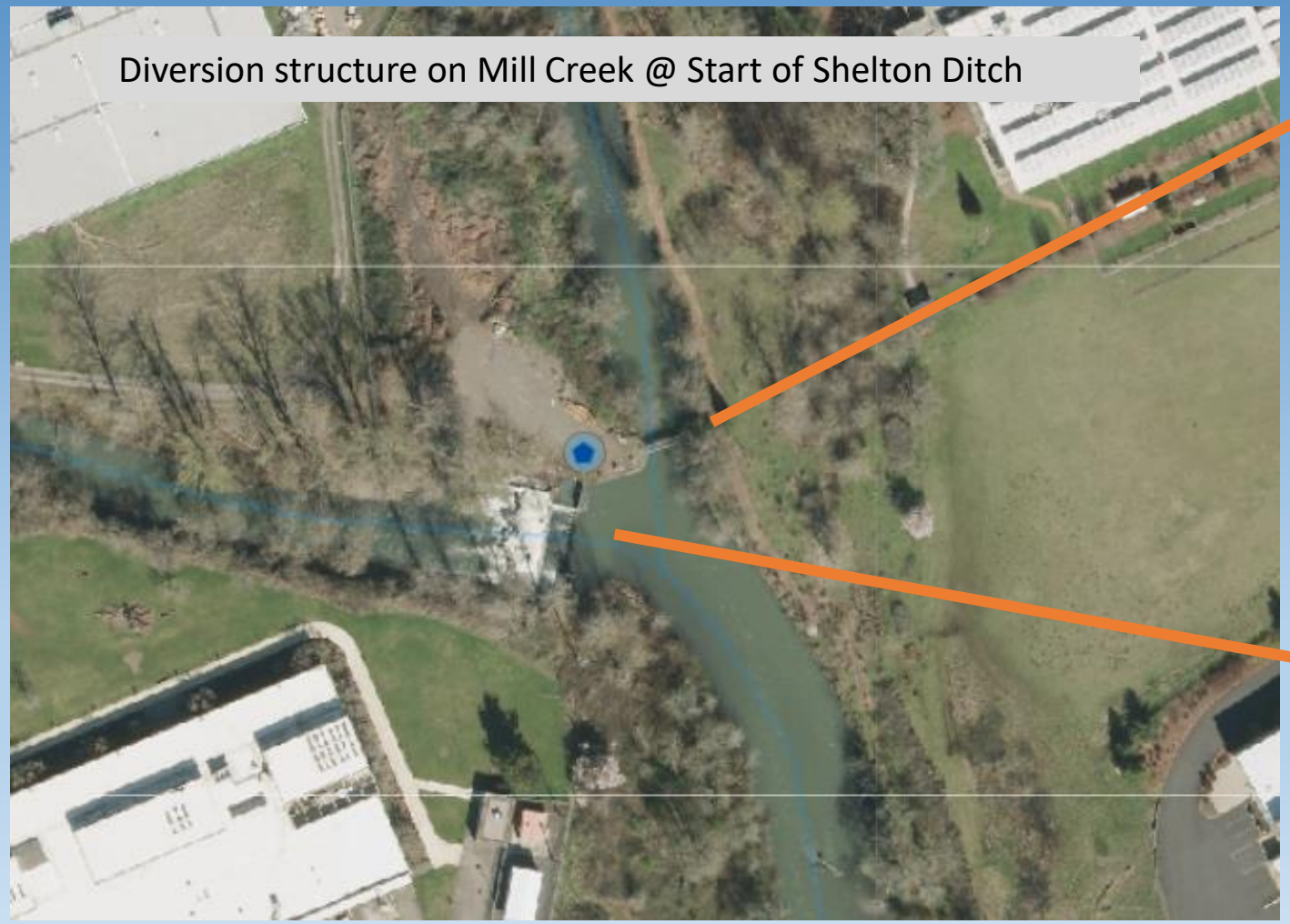
Value:

- Operational awareness/response
- Post-event analyses
- Calibrate/verify flood models and inundation levels



Operational Awareness

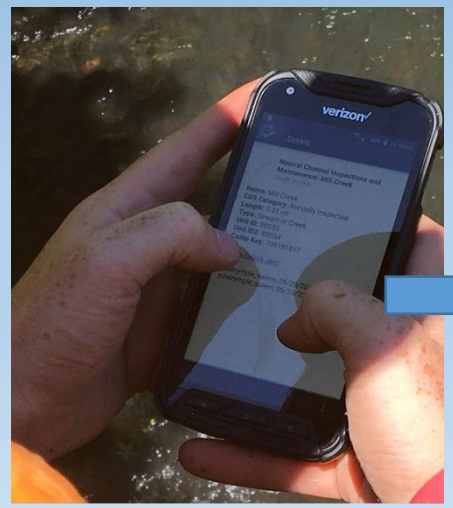
Where is the water going? How will that affect flood impact? Will changes affect flood model projections?

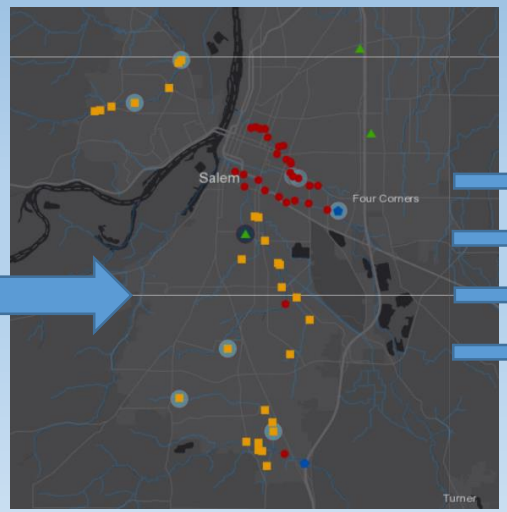


Operational Awareness

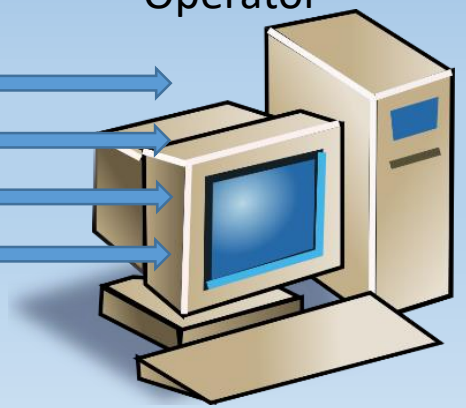


Field data inform Flood Warning System Operator ⟹ Observations OC'd & Synthesized ⟹ Shared with EOC as needed





Flood Warning System Operator



F i l t e r

https://www.everbridge.com/blog/why-every-eoc-leader-needs-to-read-the-2018-nims-update/

What kind of Perishable Data are we interested in?

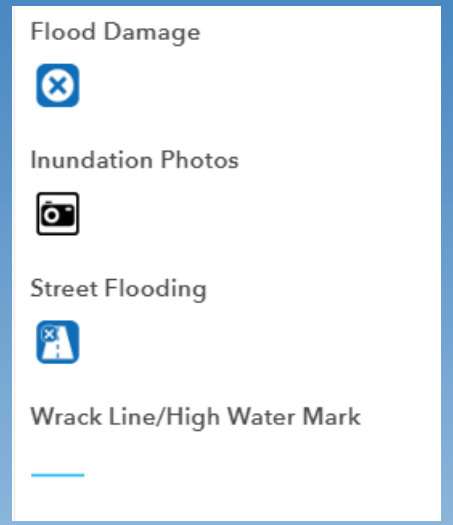
Pictures and Date/Time Stamps!!

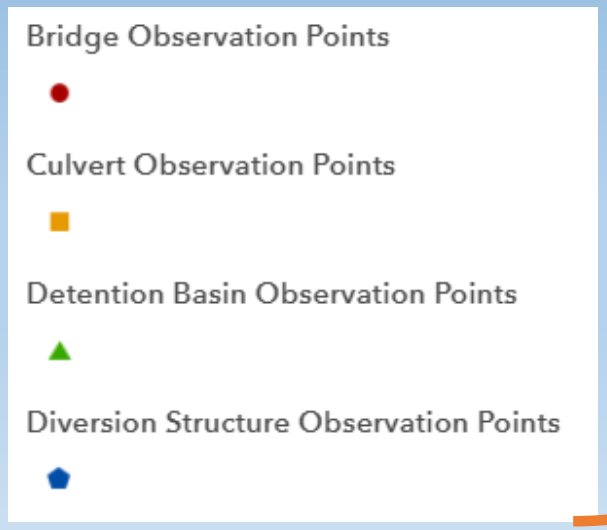
Predefined locations of interest

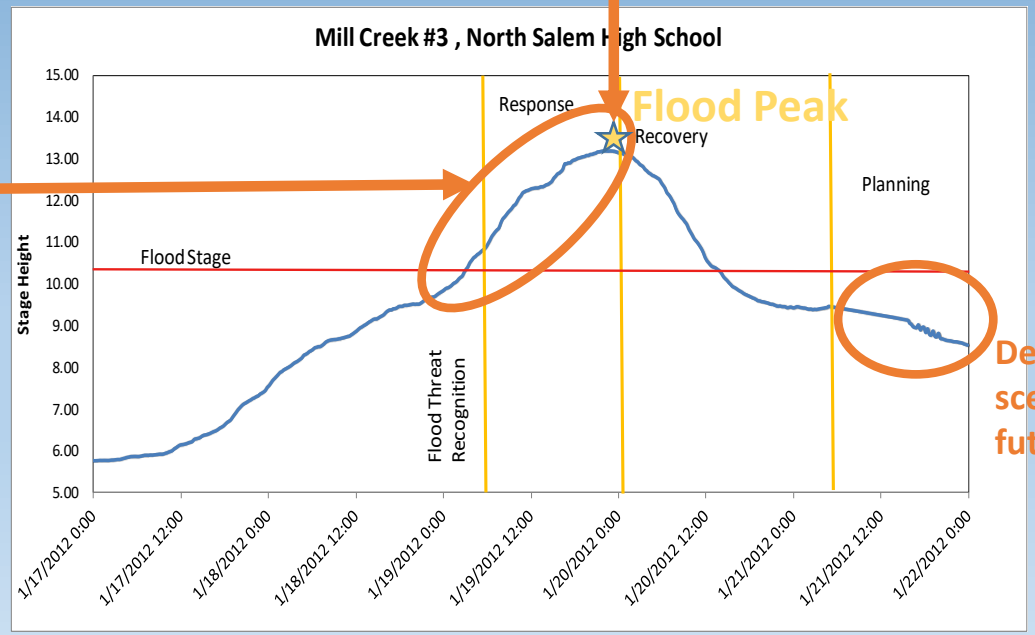
- Bridges
- Culverts
- Diversion structures
- Detention Basins

Ad Hoc Data Collection

- Street flooding
- Flood Damage
- Inundation Documentation
- High Water Marks/Wrack Lines

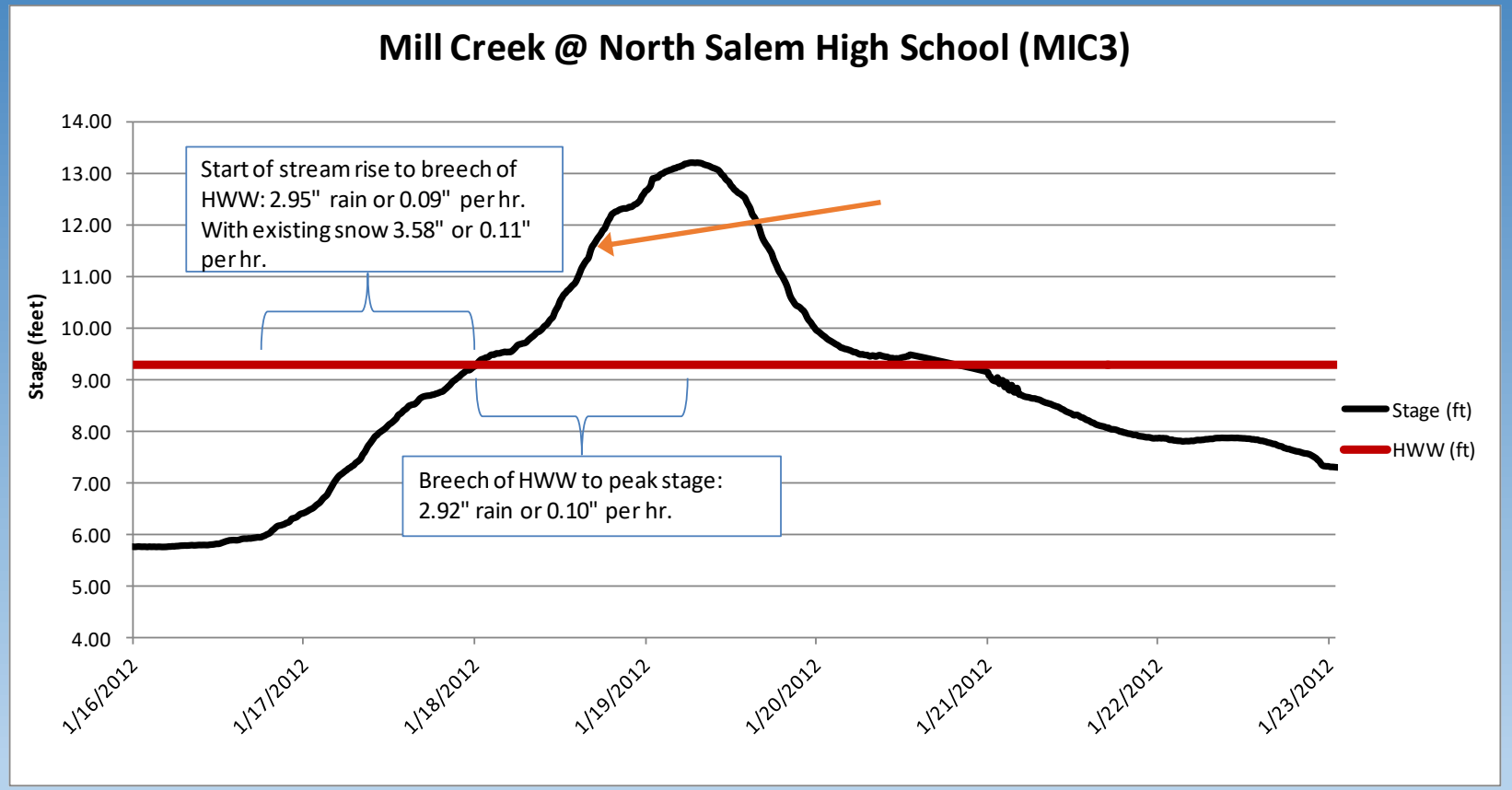






De-construct event scenario to inform future response

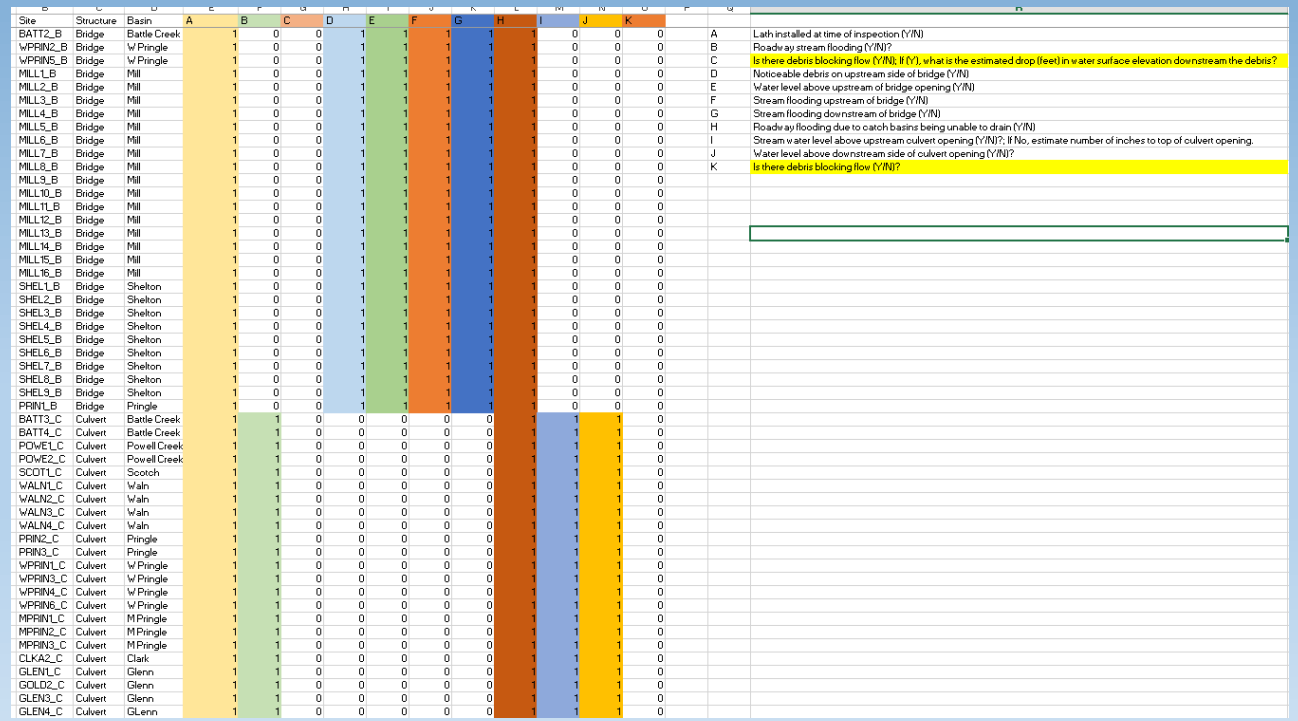
Calibrate/Verify Flood Model



- 10.1 ft. (raw) Mill Creek Begins to flood 21st and State St **(12 hours after Stage Alarm)**
- 10.4 ft. (raw) Mill Creek begins to flood 14th and A St NE
- 10.6 ft.(raw) Mill Creek floods State St. between 17th and 24th
- 11.5 ft. (raw) Shelton Ditch begins to flood Winter St. SE/Bellevue St. SE
- 11.9 ft. (raw) Flooding on Turner Rd North of Kuebler
- 12.2 ft (raw). Shelton Ditch begins to flood over 25th St. SE

Request and Data Collection Needs

- Received list from Flood Warning Operator of locations of interest and observations needed for each site
- Developed Matrix to classify sites according to observation needs



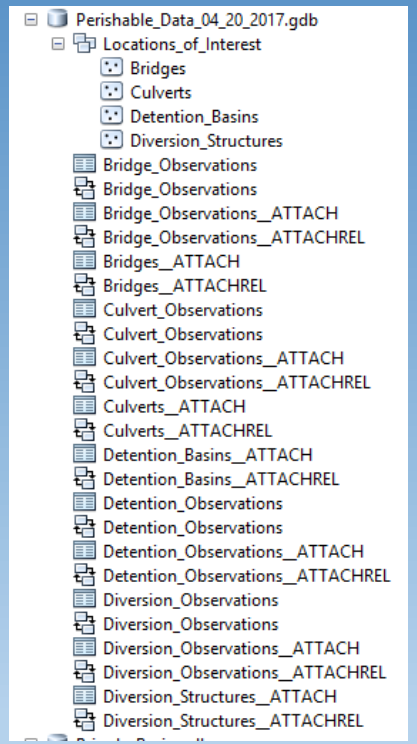
Site	Structure	Basin	A	B	C	D	E	F	G	H	I	J	K
BATT2_B	Bridge	Battle Creek	1	0	0	1	1	1	1	1	0	0	0
WPRIN2_B	Bridge	W Pringle	1	0	0	1	1	1	1	1	0	0	0
WPRIN5_B	Bridge	W Pringle	1	0	0	1	1	1	1	1	0	0	0
MILL1_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL2_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL3_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL4_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL5_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL6_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL7_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL8_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL9_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL10_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL11_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL12_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL13_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL14_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL15_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
MILL16_B	Bridge	Mill	1	0	0	1	1	1	1	1	0	0	0
SHEL1_B	Bridge	Shelton	1	0	0	1	1	1	1	1	0	0	0
SHEL2_B	Bridge	Shelton	1	0	0	1	1	1	1	1	0	0	0
SHEL3_B	Bridge	Shelton	1	0	0	1	1	1	1	1	0	0	0
SHEL4_B	Bridge	Shelton	1	0	0	1	1	1	1	1	0	0	0
SHEL5_B	Bridge	Shelton	1	0	0	1	1	1	1	1	0	0	0
SHEL6_B	Bridge	Shelton	1	0	0	1	1	1	1	1	0	0	0
SHEL7_B	Bridge	Shelton	1	0	0	1	1	1	1	1	0	0	0
SHEL8_B	Bridge	Shelton	1	0	0	1	1	1	1	1	0	0	0
SHEL9_B	Bridge	Shelton	1	0	0	1	1	1	1	1	0	0	0
PRIN1_B	Bridge	Pringle	1	0	0	1	1	1	1	1	0	0	0
BATT3_C	Culvert	Battle Creek	1	1	0	0	0	0	0	1	1	1	0
BATT4_C	Culvert	Battle Creek	1	1	0	0	0	0	0	1	1	1	0
POWE1_C	Culvert	Powell Creek	1	1	0	0	0	0	0	1	1	1	0
POWE2_C	Culvert	Powell Creek	1	1	0	0	0	0	0	1	1	1	0
SCOT1_C	Culvert	Scotch	1	1	0	0	0	0	0	1	1	1	0
WALN1_C	Culvert	Waln	1	1	0	0	0	0	0	1	1	1	0
WALN2_C	Culvert	Waln	1	1	0	0	0	0	0	1	1	1	0
WALN3_C	Culvert	Waln	1	1	0	0	0	0	0	1	1	1	0
WALN4_C	Culvert	Waln	1	1	0	0	0	0	0	1	1	1	0
PRIN2_C	Culvert	Pringle	1	1	0	0	0	0	0	1	1	1	0
PRIN3_C	Culvert	Pringle	1	1	0	0	0	0	0	1	1	1	0
WPRIN1_C	Culvert	W Pringle	1	1	0	0	0	0	0	1	1	1	0
WPRIN3_C	Culvert	W Pringle	1	1	0	0	0	0	0	1	1	1	0
WPRIN4_C	Culvert	W Pringle	1	1	0	0	0	0	0	1	1	1	0
WPRIN6_C	Culvert	W Pringle	1	1	0	0	0	0	0	1	1	1	0
MPRIN1_C	Culvert	M Pringle	1	1	0	0	0	0	0	1	1	1	0
MPRIN2_C	Culvert	M Pringle	1	1	0	0	0	0	0	1	1	1	0
MPRIN3_C	Culvert	M Pringle	1	1	0	0	0	0	0	1	1	1	0
CLKA2_C	Culvert	Clark	1	1	0	0	0	0	0	1	1	1	0
GLEN1_C	Culvert	Glenn	1	1	0	0	0	0	0	1	1	1	0
GOLD2_C	Culvert	Glenn	1	1	0	0	0	0	0	1	1	1	0
GLEN3_C	Culvert	Glenn	1	1	0	0	0	0	0	1	1	1	0
GLEN4_C	Culvert	GLenn	1	1	0	0	0	0	0	1	1	1	0

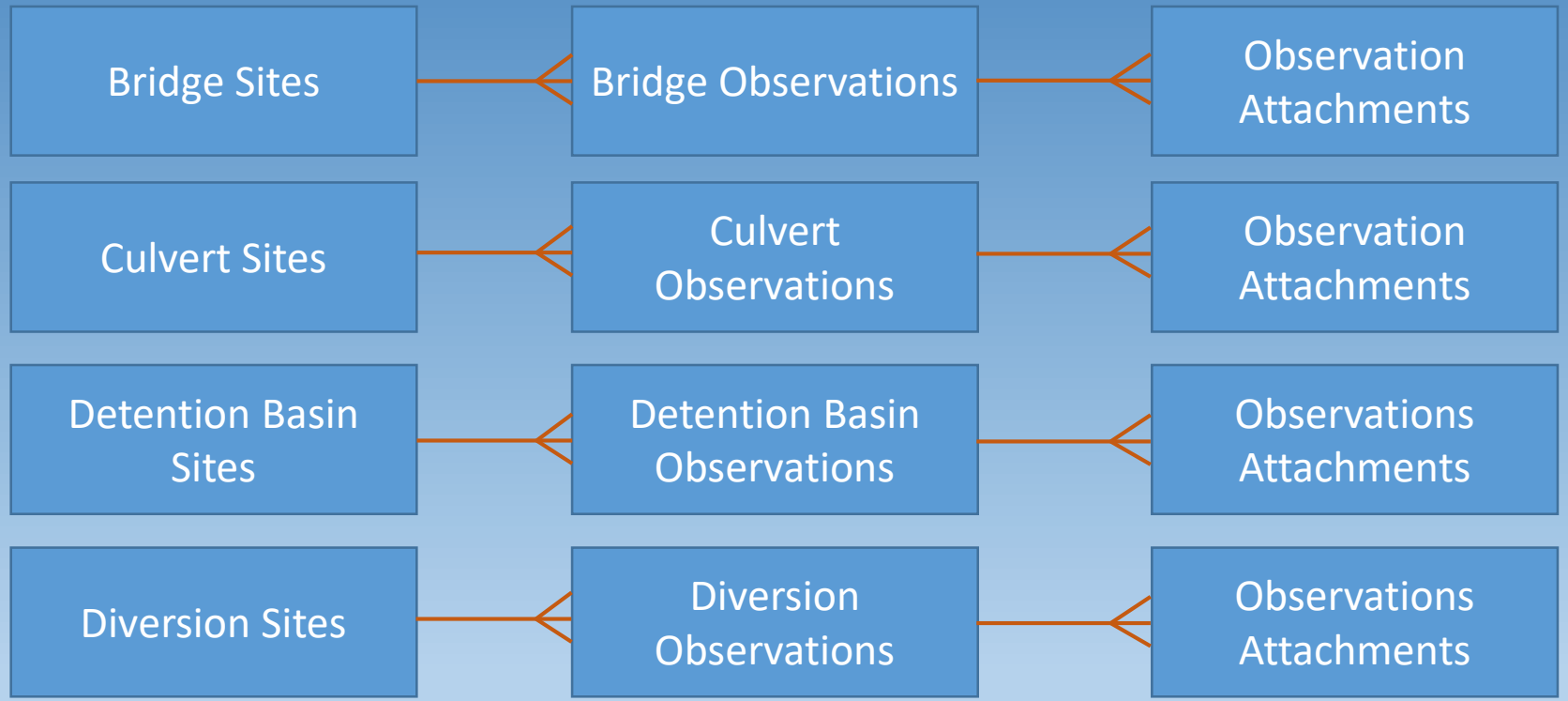
A	Lath installed at time of inspection (Y/N)
B	Roadway stream flooding (Y/N)?
C	Is there debris blocking flow (Y/N); If (Y), what is the estimated drop (feet) in water surface elevation downstream the debris?
D	Noticeable debris on upstream side of bridge (Y/N)
E	Water level above upstream of bridge opening (Y/N)
F	Stream flooding upstream of bridge (Y/N)
G	Stream flooding downstream of bridge (Y/N)
H	Roadway flooding due to catch basins being unable to drain (Y/N)
I	Stream water level above upstream culvert opening (Y/N)?; If No, estimate number of inches to top of culvert opening.
J	Water level above downstream side of culvert opening (Y/N)?
K	Is there debris blocking flow (Y/N)?

Part Two – Application & Data Collection Structure

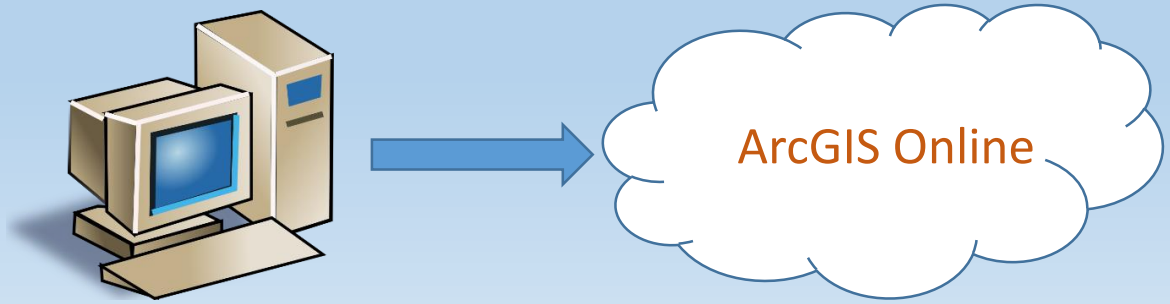
Build Schema, Publish Feature Services

1:Many Relationships for feature classes

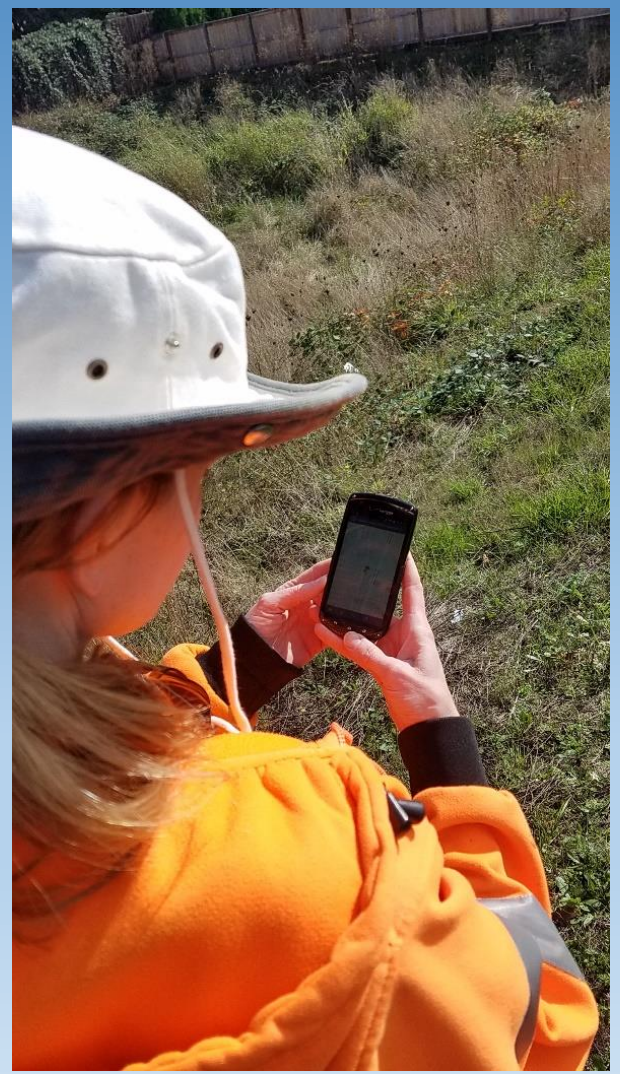




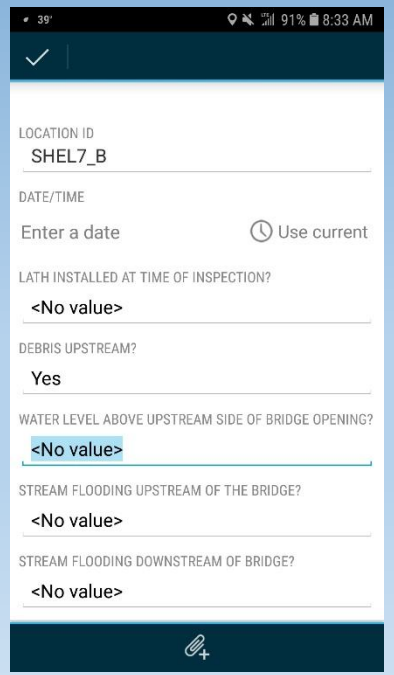
*Domain Values for validation



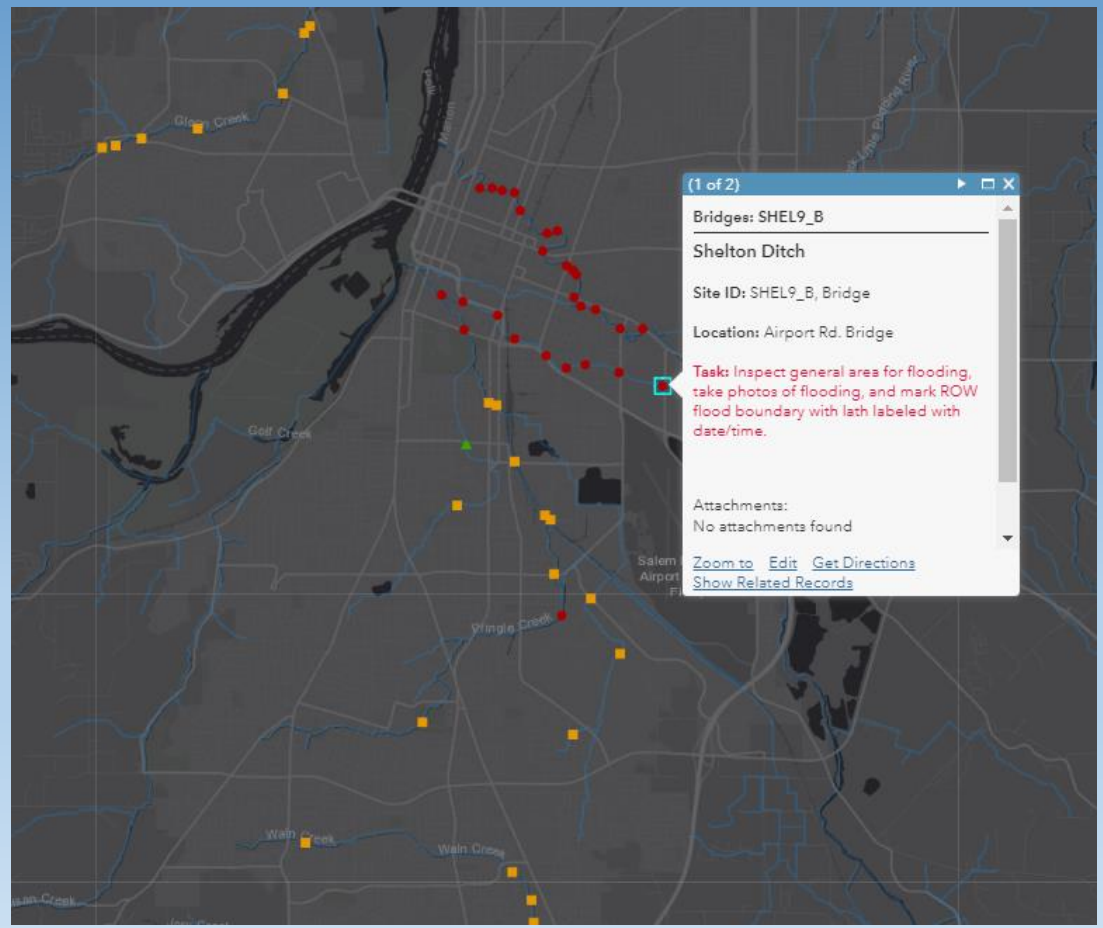
Build Web Map, Test



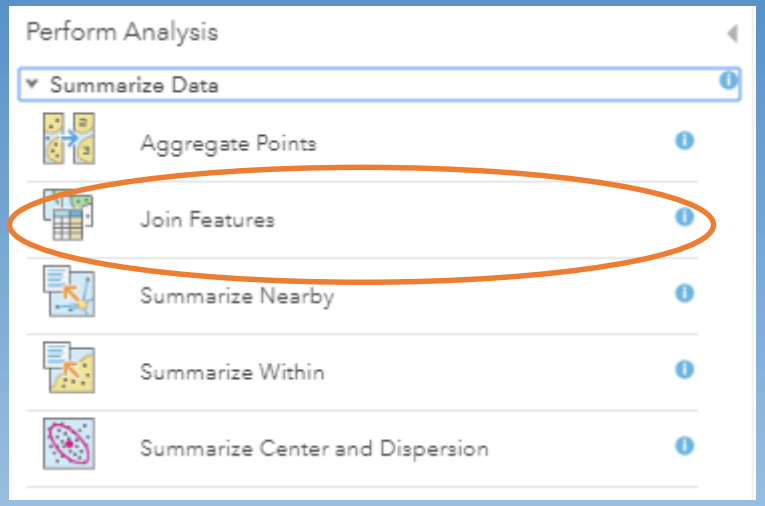
App needs to be fast and easy to use for non-technical end users



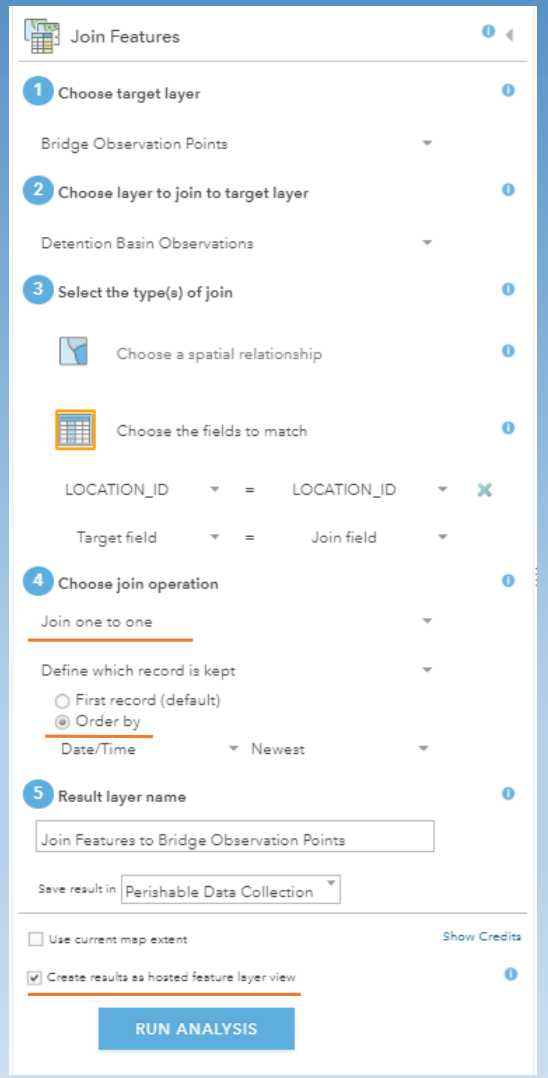
Primary Complaint: Inability of Flood Warning System Operator to see which sites have been visited and how recently

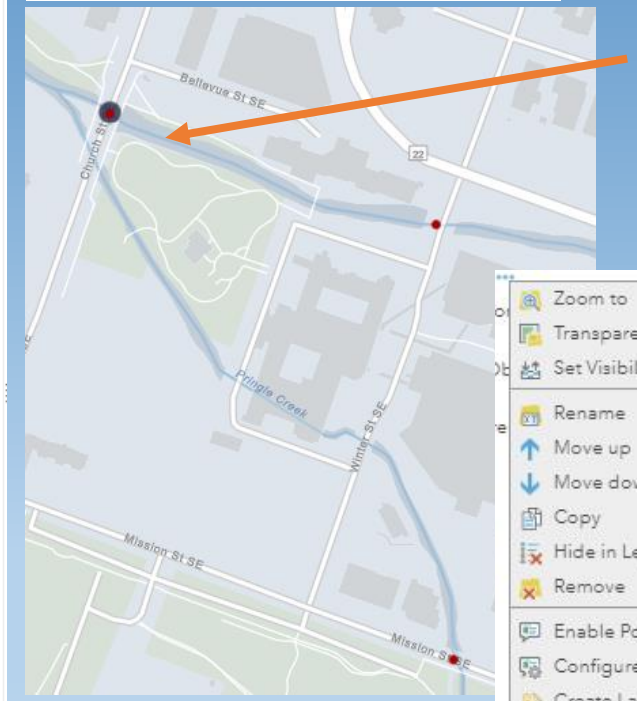


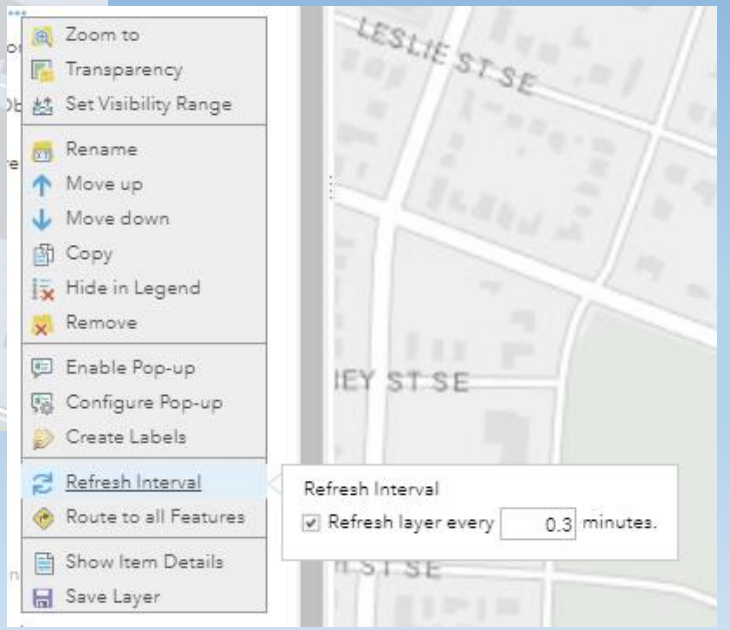
How can we call attention to the addition of related records?



1. Join parent feature layer to child table and create a new feature layer view
2. Place new join view below parent feature in TOC
3. Set refresh interval

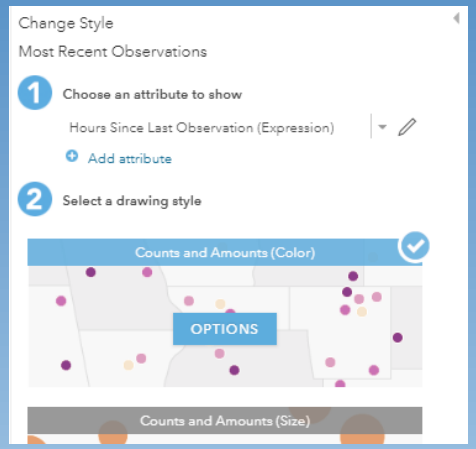




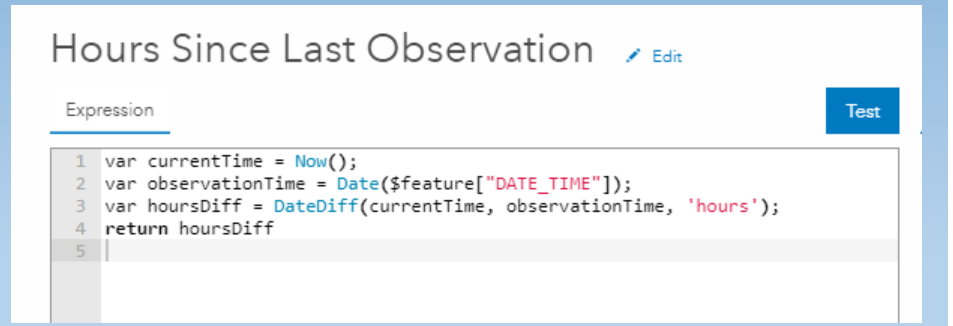


Time-Aware Symbology

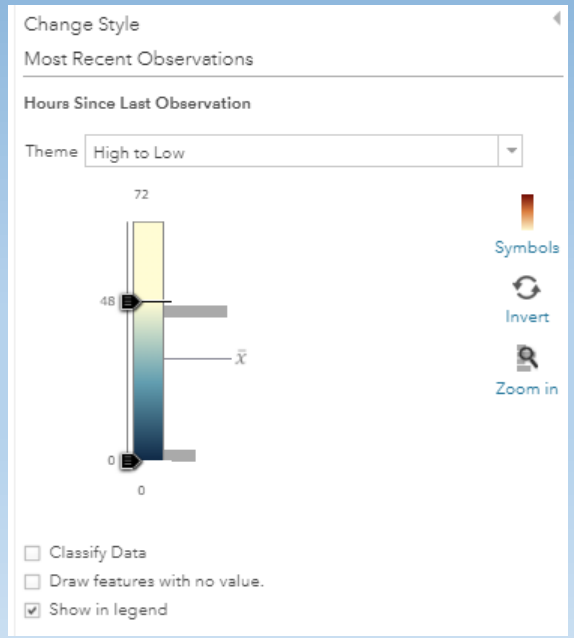
1. Add arcade expression to symbology for join feature layer view

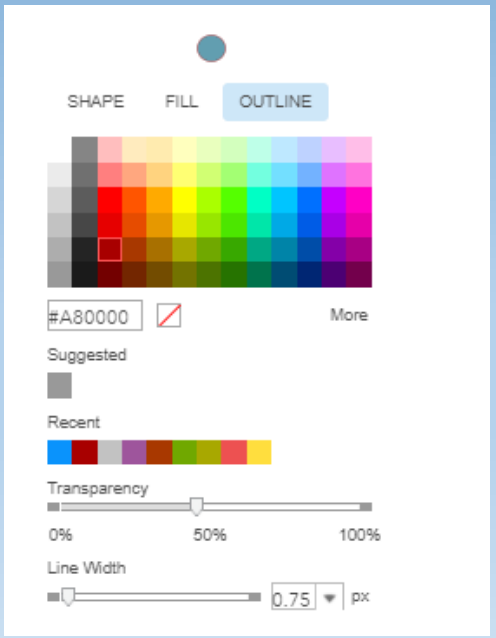


2. Add arcade expression to symbology for join feature layer view



3. Pick outline that stays constant as fill changes with time

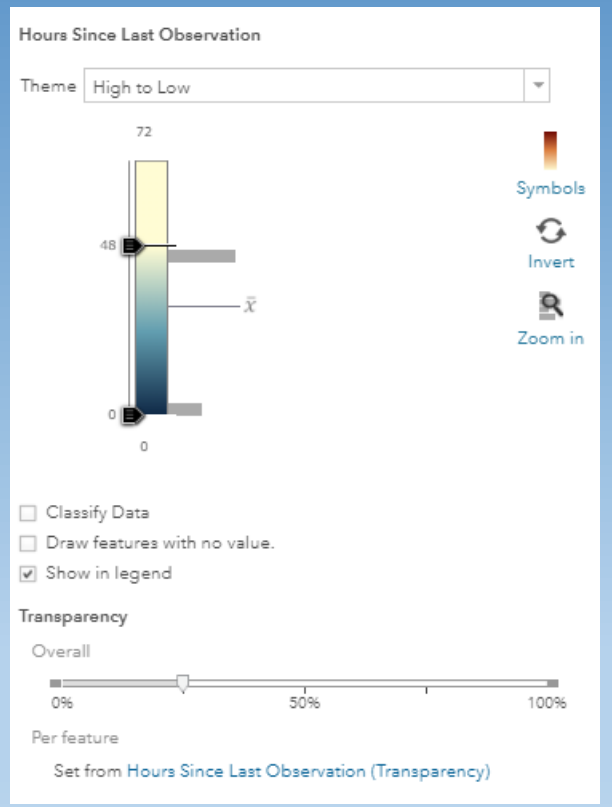




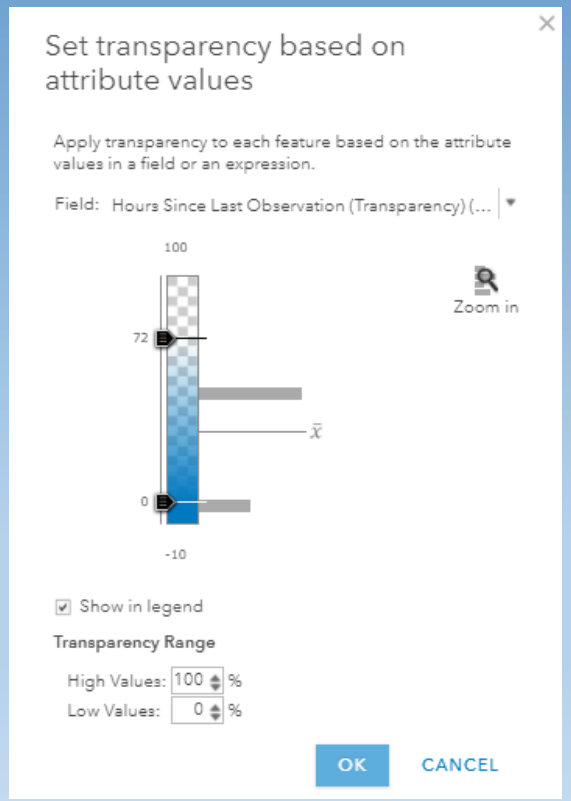
Time-Aware Transparency

(Back to the Future Symbology)

1. Use same DateDiff arcade expression to set transparency based on time since last observation

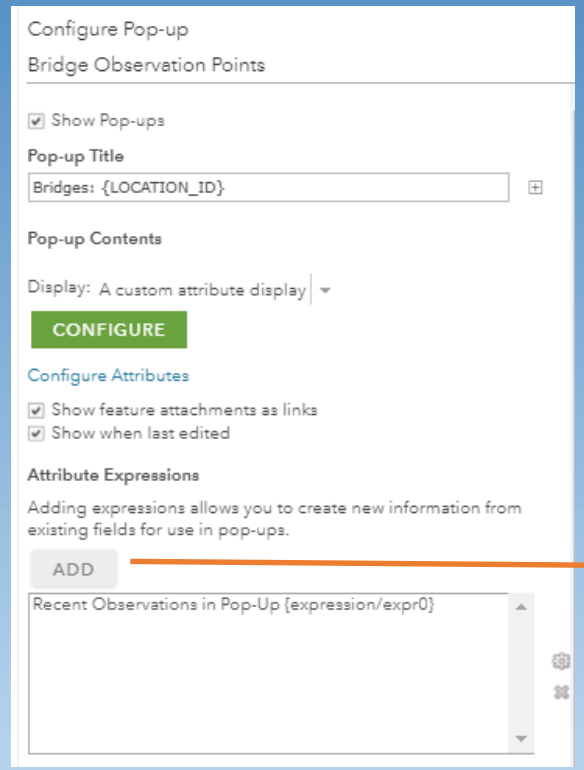


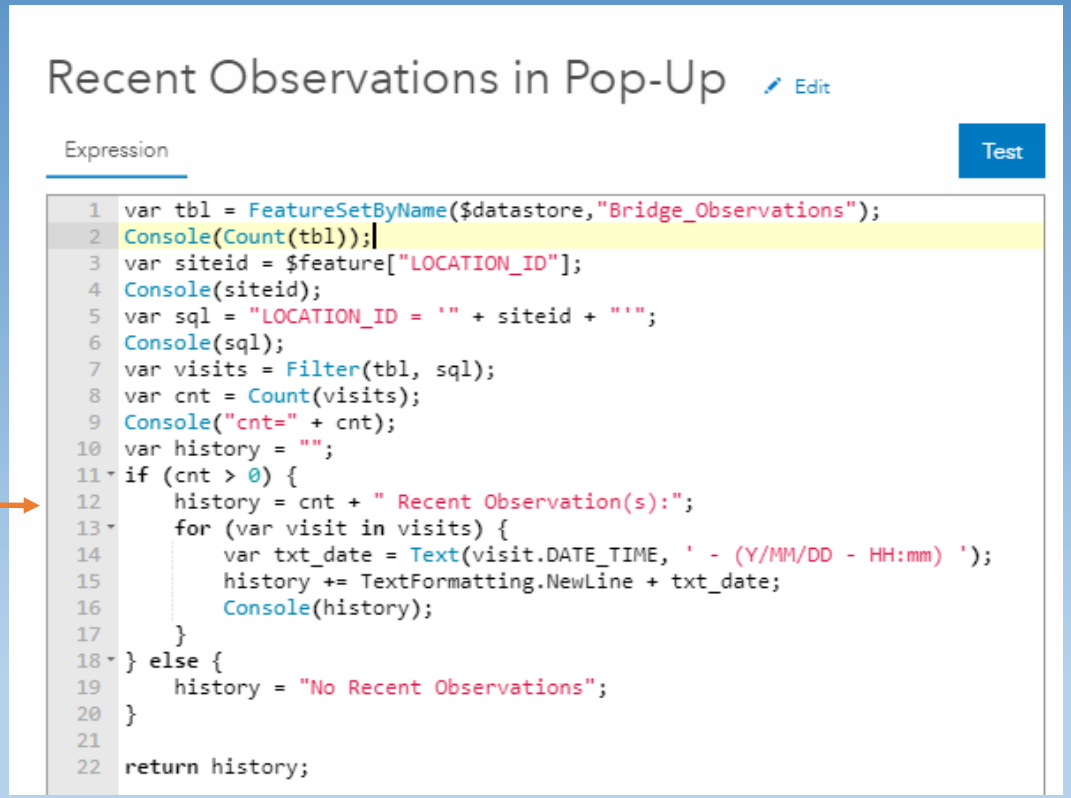
2. Set Transparency values



http://www.trgarts.com/TRGInsights/Article/tabid/147/ArticleId/346/Contextual-marketing-back-to-the-future.aspx?dnnprintmode=true&SkinSrc=[G]Skins%2F_default%2FNo+Skin&ContainerSrc=[G]Containers%2F_default%2FNo+Container

Related Inspection Records in Parent Feature Pop-ups





- Access observations table using $datastore or $map and assign as a variable
- Read site ID for current feature
- Define SQL expression to filter the child observations table
- Use SQL expression to filter the table
- Perform a count to determine if number of records is greater than zero
- Read out details if count is greater than zero

Xander Bakker GeoNet Thread:

https://community.esri.com/docs/DOC-12773-using-featuresetby-functions-in-arcade-to-drill-down-to-other-layers-and-tables

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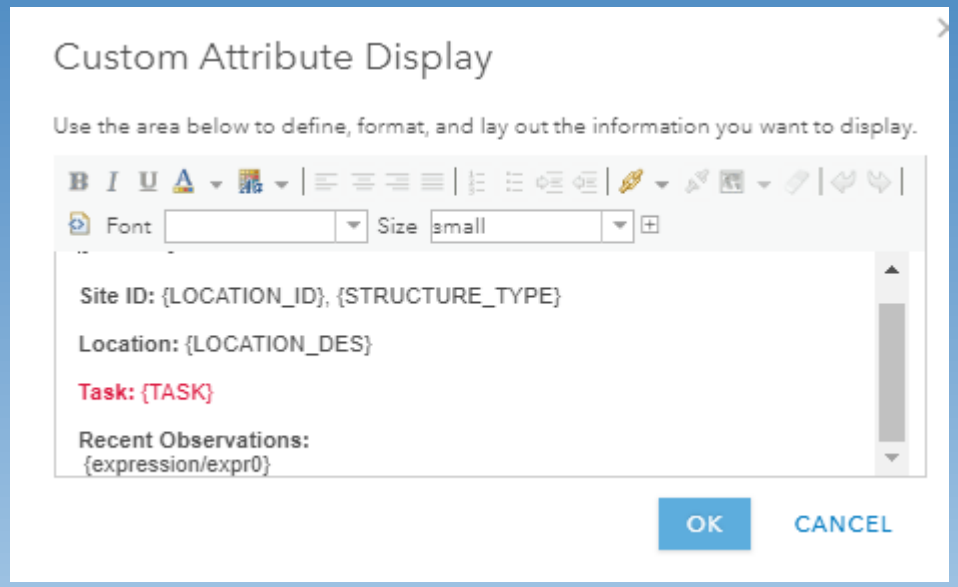
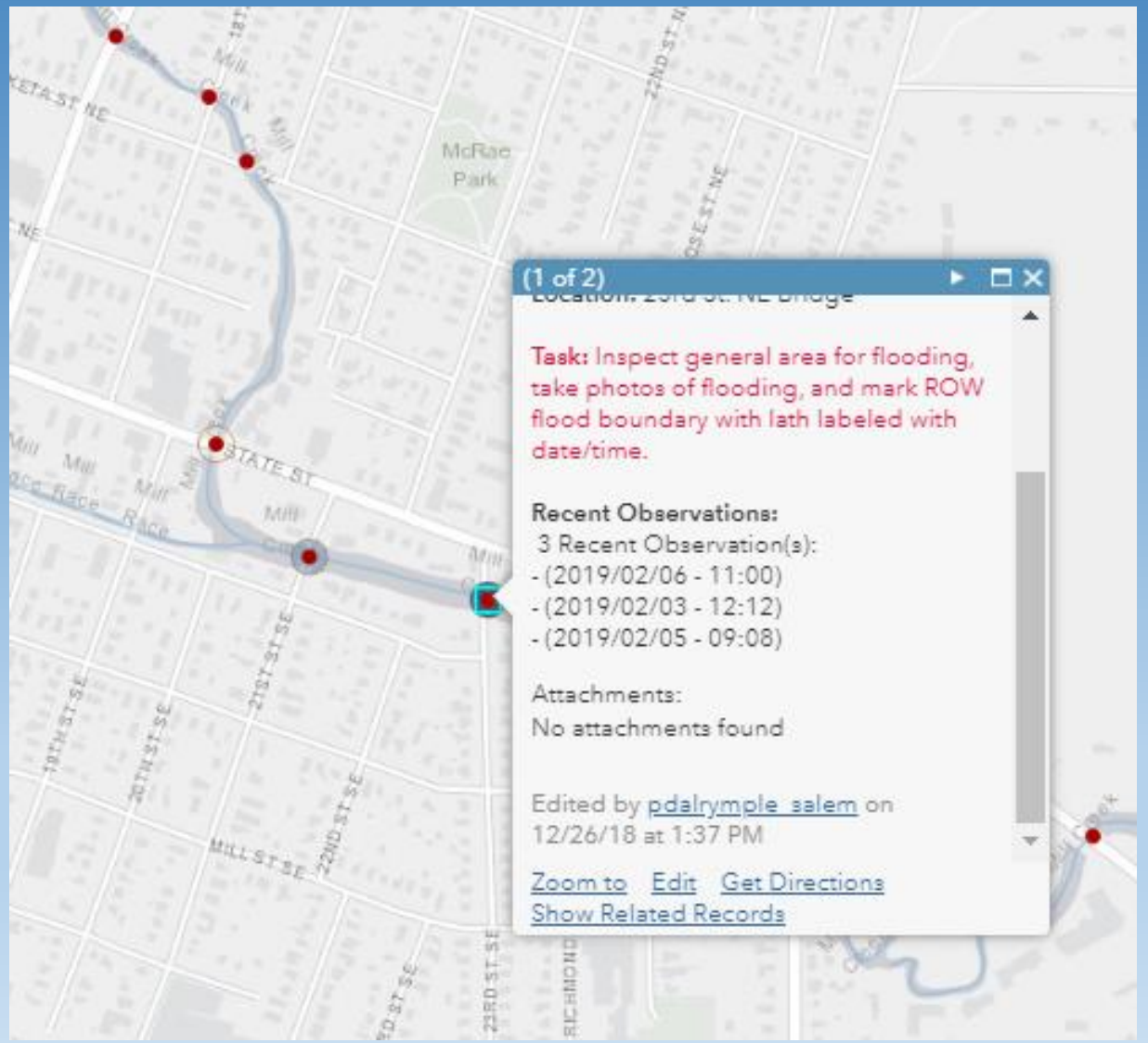


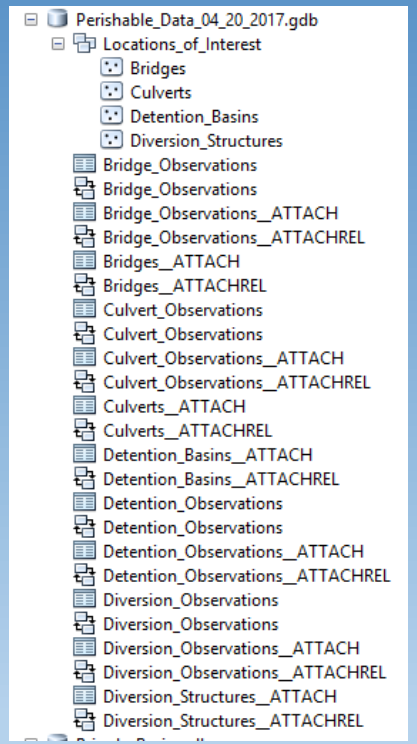
- Add expression to pop-up configuration
- Impress your friends….

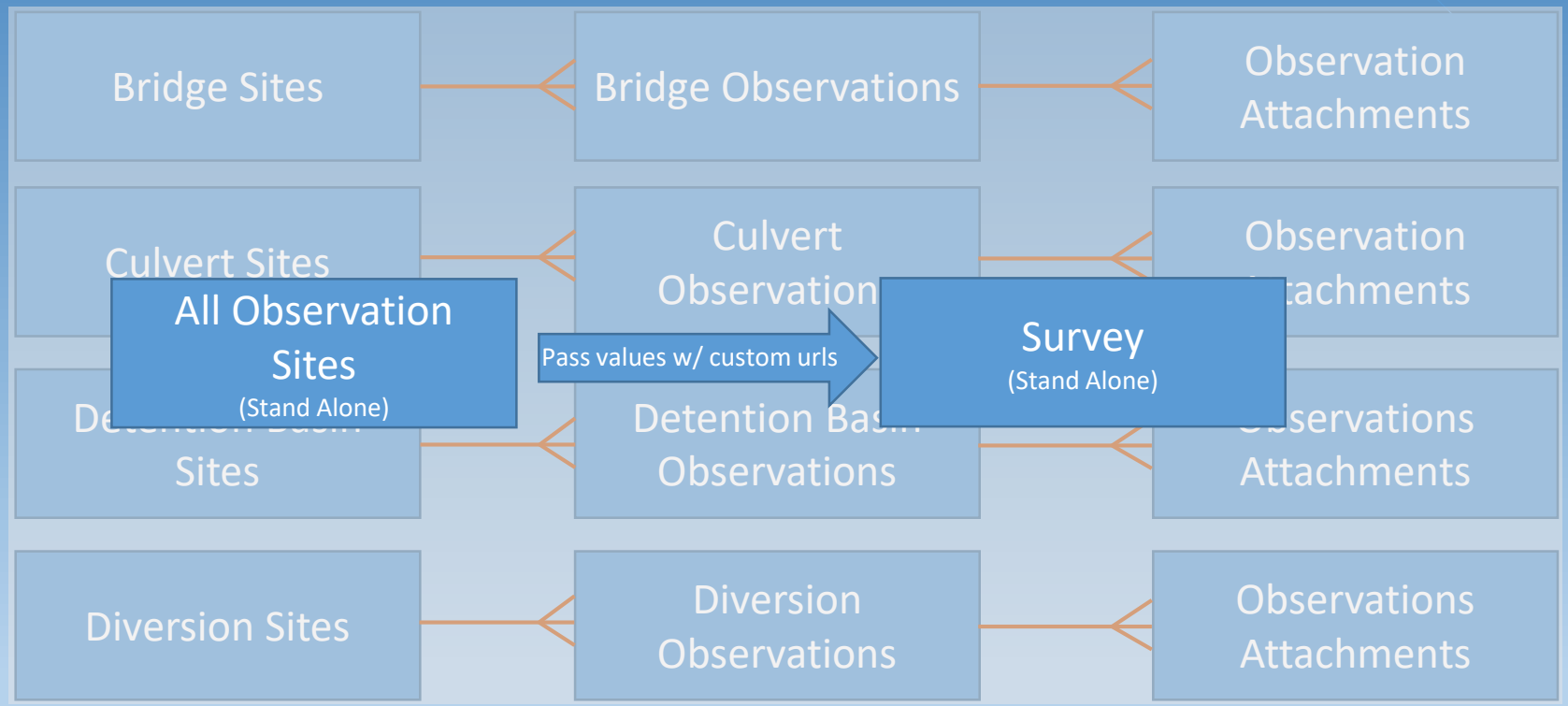


Can we do even more?

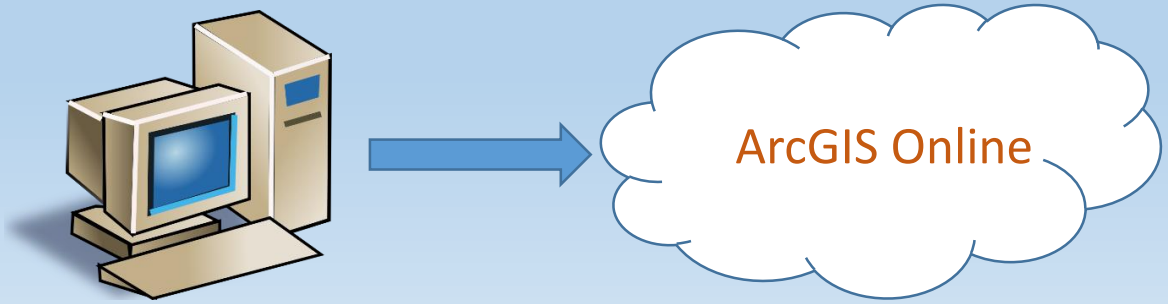
Rethinking the use of multiple feature layers. These can be combined into one, unrelated survey layer.

~~1:Many Relationships for feature classes~~



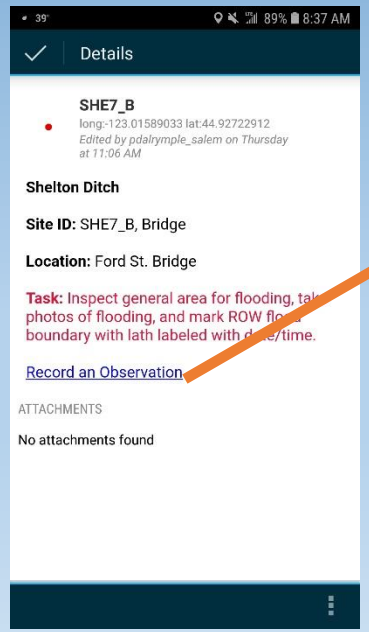


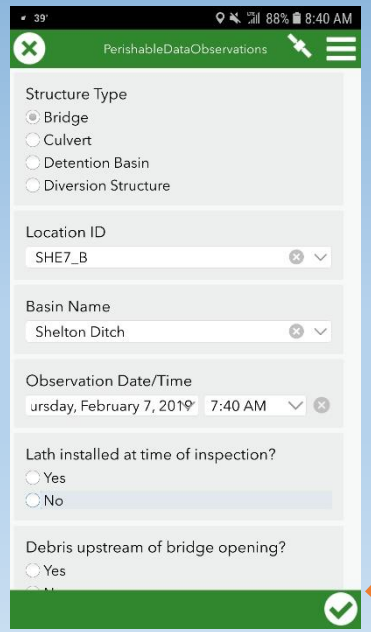
*Domain Values for validation

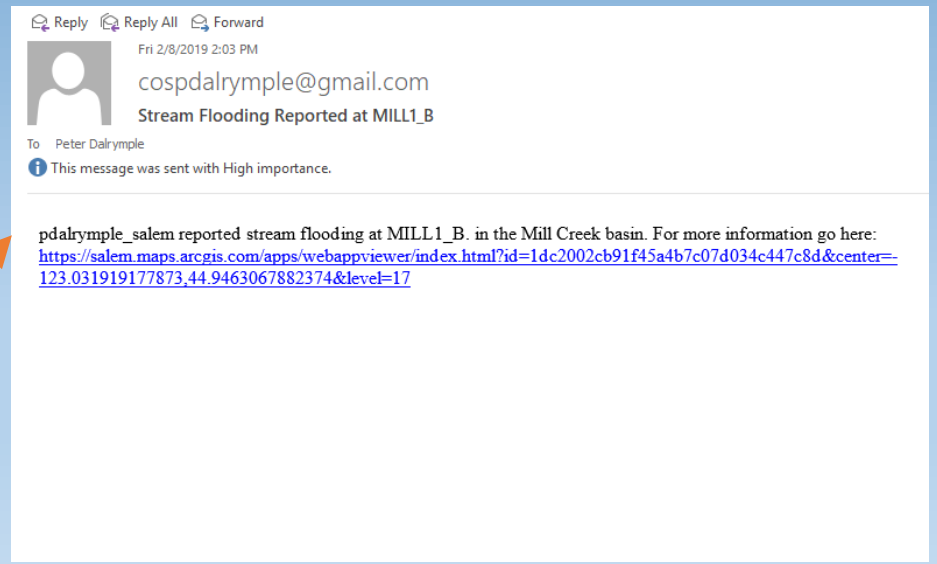


Demo

- Custom urls to launch Survey123 and pass parent feature values to survey
- Webhooks and Microsoft Flow to send email notifications when new surveys meeting certain criteria are submitted
- Use dynamic content from Survey123 in Microsoft Flow for url parameters to launch ArcGIS Online application, center, and zoom to newly submitted survey point







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