

# Conservation in the Blue River Watershed: Leveraging ArcGIS Online and Microsoft Power BI to create interactive Dashboards and reports.

Caleb Biles | GIS Analyst | The Oka Institute



# Would You Rather



Live here

OR



Here

# Would You Rather

The image shows a screenshot of an Excel spreadsheet. The spreadsheet contains a large table with multiple columns. The columns are labeled with letters A through Z. The data includes various project details such as dates, locations, and organizational information. The table is dense with text, and the spreadsheet interface includes standard Excel toolbars and a search bar at the top.

Live here (Excel)

The image shows a screenshot of a Power BI report titled "BIA Blue River Habitat Restoration | Weekly Report". The report is dated Tuesday, February 03, 2026. It features several summary cards and a detailed table. The summary cards show:
 

- OVERVIEW:** TOTAL Planned and Completed Spending: \$2,364,862; OKA Planned and Completed Spending: \$1,364,538; OPJV Planned and Completed Spending: \$1,000,324.
- TOTAL Acres with Management Plans:** 25,405; OKA Acres: 12,442; OPJV Acres: 12,963.
- TOTAL Linear Feet with Management Plans:** 246,270; OKA Linear Feet: 110,988; OPJV Linear Feet: 135,282.
- INVOICING:** TOTAL INVOICES PAID: \$31,751; OKA: \$17,232; OPJV: \$14,519.
- CONSERVATION FUNDS REMAINING:** OKA Initial Balance of \$1.37M: \$5,462; OPJV Initial Balance of \$1.35M: \$349,676.
- NEPA FUNDS REMAINING:** NEPA: 18,971.

 The bottom section of the report is a table titled "NEPA PROJECT STATUS" with columns for Project Name, Consultant Review, Consultant Review Initiated, Estimated Site Visit, BIA Arch Review, BIA Arch Review Initiated, BIA Final Review, and BIA Final Review Initiated. The table lists various projects such as Gregory Loper 1, John Moody, Julie Jones, Marysol Brandon, Oka'Yanali Preserve (East), Oka'Yanali Preserve (West), Steve Roy, Wallace Coppedge, Cobbin (Wadebever Lease), Pontotoc Ridge Preserve, Drew Armstrong, Cain Cattle 1, and Oday (Wadebever Lease).

Here (Power BI)

OR



# Project Overview

- ◆ Funding: Bureau of Indian Affairs (BIA) Grant
- ◆ Project Area: Upper Blue River Watershed
- ◆ Project Objectives: Implement 15,000 acres of conservation throughout the watershed.

*“To improve wildlife habitation, reduce habitat fragmentation and reestablish healthy riparian systems through habitat connectivity”*



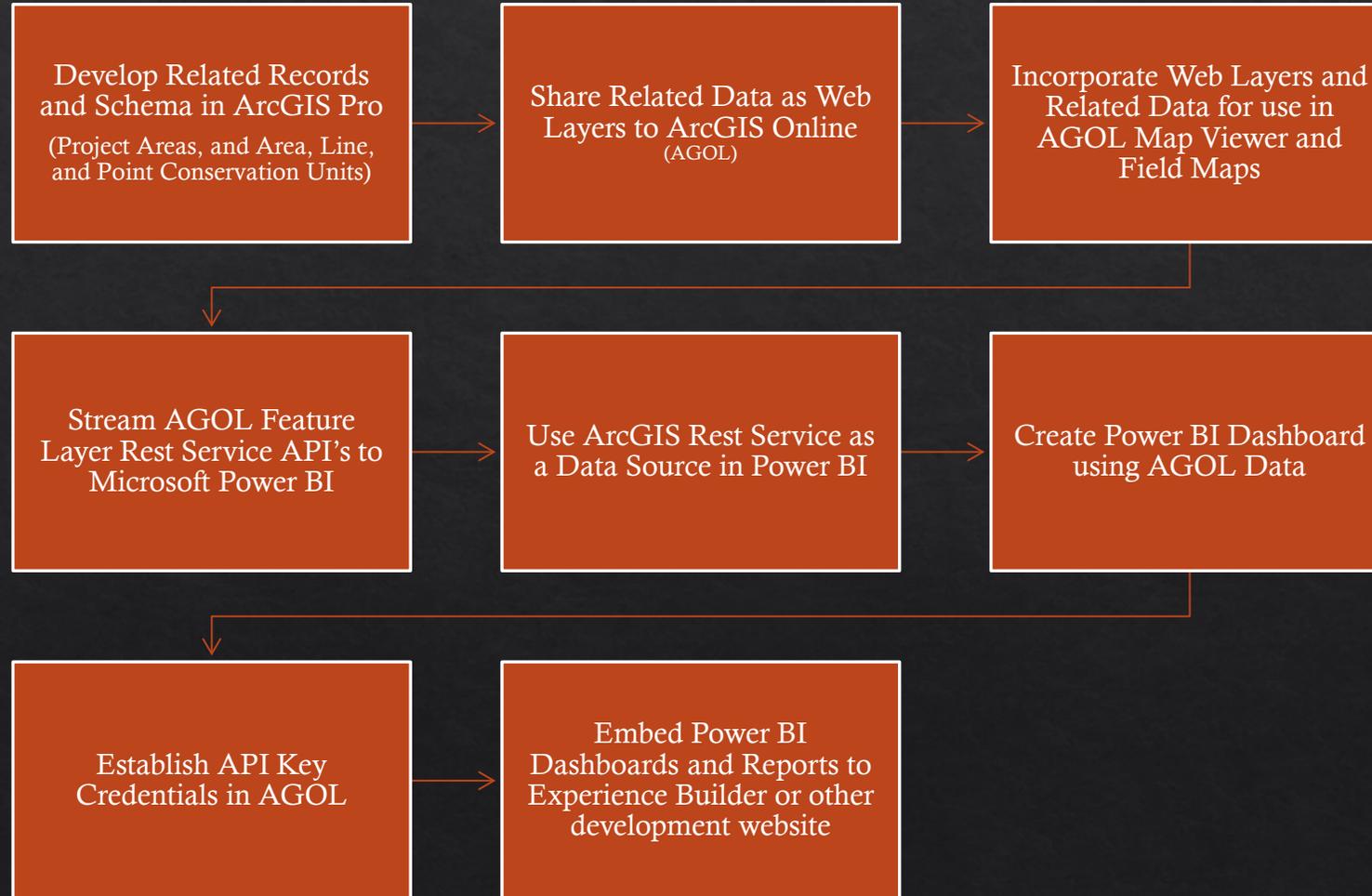
# Project Partners

- ◇ The Oka Institute at East Central University
- ◇ The Oaks and Prairies Joint Venture
- ◇ The Chickasaw Nation

# GIS and Data Objectives

- ◇ Maintain a digital system for housing monitoring data and map-based outputs.
- ◇ Capture land and water monitoring information through onsite visits.
- ◇ Incorporate project outcomes into Oka's public-facing web portal (Oka Spatial).

# GIS and Data Objectives



# Develop Related Records and Schema in ArcGIS Pro

- ◇ Create Empty Feature Class & Empty Table (or use existing layer)

- ◇ Conservation point, line, and area units, and project areas as existing layer.

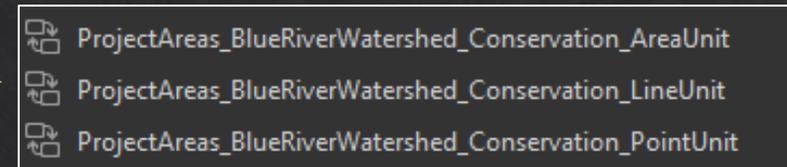
- ◇ Prepare Feature Class and Table for Relationship

- ◇ Create Relationship Class

- ◇ Add Fields to Feature Class and Related Table

- ◇ Add Domains

- ◇ Publish to Online (AGOL) Account or Portal



## Publishing and Configuring a Feature Class for Field Maps

CSA leverages ArcGIS Pro and Field Maps to create, publish and configure feature classes for collecting data on invasive species in OK

**Candace Johnston (c.johnston@ou.edu) and Daniela Spade (dspade@ou.edu)**

April 13, 2022

<https://storymaps.arcgis.com/stories/06b7a0d3e248492c810c63a4a1702dea>

# Share Related Data as Web Layers to ArcGIS Online (AGOL)

Share As Web Layer

Sharing selected layer as a web layer

General Configuration Content

Item Details

Name  
Project Areas

Summary

Tags

Categories

Layer Type

Feature

Tile

Vector Tile

Feature

Location

Folder  
BIA TRC Blue River Habitat Restoration

Sharing Level

Owner  
Owner of the item(s) has access

Organization  
All members of your organization have access

Everyone (public)  
People outside your organization have access

Groups

BIA Blue River Watershed Mapping Group

Center of Excellence - Sustainable Communities Mapping Group

Center of Excellence for Sustainable Communities Content

Center of Excellence for Sustainable Communities Core Team

Finish Sharing

Analyze Publish Jobs



Project Areas within the Blue River Watershed

Feature layer (hosted) | Public data collection

Item updated: Oct 27, 2025

Description

An in-depth description of the item is not available.

[Add a description](#)

Layers

- ProjectAreas\_BlueRiverWatershed  
Polygon layer
- Conservation Point Unit  
Point layer
- Conservation Line Unit  
Line layer
- Conservation Area Unit  
Polygon layer



# Prepare Layers for Use in Field Maps (A lot of Arcade!)

Landowner and Property Contact Information 7

Landowner Name

Property Contact Name

Land Holder Abbreviation for Unique ID Generation

Up to the discretion of the data manager. Generally, this is an abbreviation or name depending on what provides the most clarity.

ID #

For each project area, there will be a designated # beginning at 1001. If the landholder or entity has multiple properties with each its separate management plan, the second property would be assigned a 1 002, and so forth.

Conservation Lands - Unique ID

Read-only  Calculated

Property Contact Number

Property Contact Email

```
Arcade editor
Title
Total Potential Spending

Run
1 var AreaCost = FeaturesetByRelationshipName($feature, "Conservation_AreaUnit", ['Cost_Total']);
2 var SumAreaCostValue = Sum(AreaCost, 'Cost_Total');
3
4 var LineCost = FeaturesetByRelationshipName($feature, "Conservation_LineUnit", ['Cost_Total']);
5 var SumLineCostValue = Sum(LineCost, 'Cost_Total');
6
7 return SumAreaCostValue + SumLineCostValue
8
```

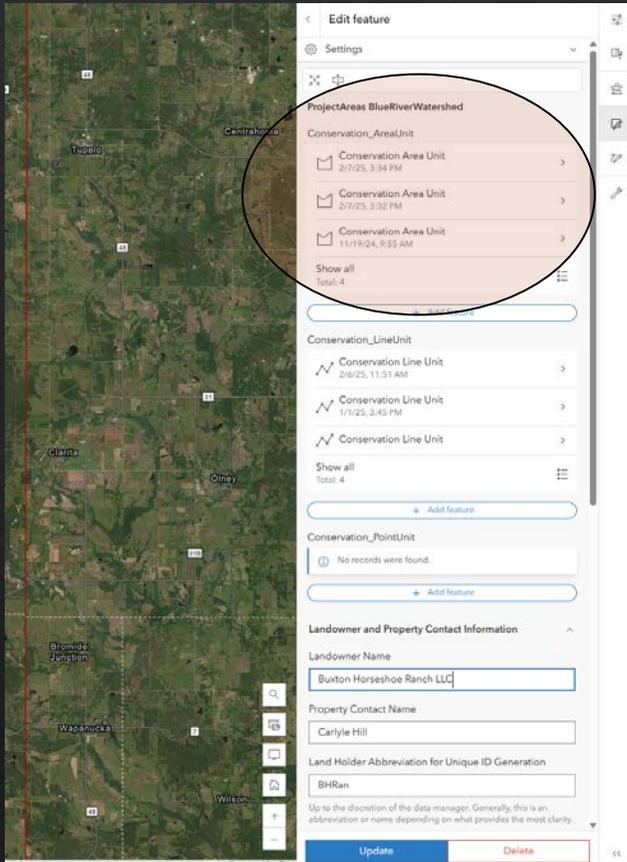
(return sum of related records)

```
Arcade editor
Title
Total Cost per Area Unit Type

Run
32 else if ($feature.Conservation_Practice == "316.5") {
33 }
34
35 else if ($feature.Conservation_Practice == "340.0") {
36   return round($feature.Acrees * 42.65, 2);
37 }
38 else if ($feature.Conservation_Practice == "342.0") {
39   return round($feature.Acrees * 398.89, 2);
40 }
41 else if ($feature.Conservation_Practice == "666.0") {
42   return round($feature.Acrees * 41.22, 2);
43 }
44 else if ($feature.Conservation_Practice == "666.1") {
45   return round($feature.Acrees * 263.57, 2);
46 }
47
48 else if ($feature.Conservation_Practice == "315.0") {
49   return round($feature.Acrees * 21.59, 2);
50 }
51
52 else if ($feature.Conservation_Practice == "595.0") {
53   return round($feature.Acrees * 53.51, 2);
54 }
55
56 else if ($feature.Conservation_Practice == "556.0") {
57   return round($feature.Acrees * 188.04, 2);
58 }
59
60 else if ($feature.Conservation_Practice == "596.0") {
61   return round($feature.Acrees * 21.82, 2);
62 }
63
64 else if ($feature.Conservation_Practice == "398.0") {
65   return round($feature.Acrees * 48.89, 2);
66 }
67
68 else if ($feature.Conservation_Practice == "528.0") {
69   return round($feature.Acrees * 11.85, 2);
70 }
71
72 else if ($feature.Conservation_Practice == "528.1") {
73   return round($feature.Acrees * 15.68, 2);
74 }
75
76 else if ($feature.Conservation_Practice == "523.0") {
77   return round($feature.Acrees * 628.92, 2);
78 }
79
80 else if (isEmpty($cons_pract_type)) {
81   return 0.00;
82 }
83
84 else {
85   return null;
86 }
```

(If Else)

# Incorporate Web Layers and Related Data for use in AGOL Map Viewer and Field Maps



Related Record



**Conservation Line Unit**

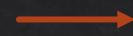
- Fence: Excluding livestock and other animals from sensitive areas to prevent contamination and physical damage.
- Firebreak: Constructed - Slight Slopes with Light Equipment (e.g. moving or brush hogging)
- Firebreak 1: Constructed - Moderate Slopes with Medium Equipment (e.g. bladed line)
- Firebreak 2: Constructed - Steep Slopes with Medium Equipment (e.g. clearing significant timber)
- Firebreak 3: Re-Construct Firebreaks where prior firebreaks existed, and they are not useable
- Use Exclusion

Parent Feature



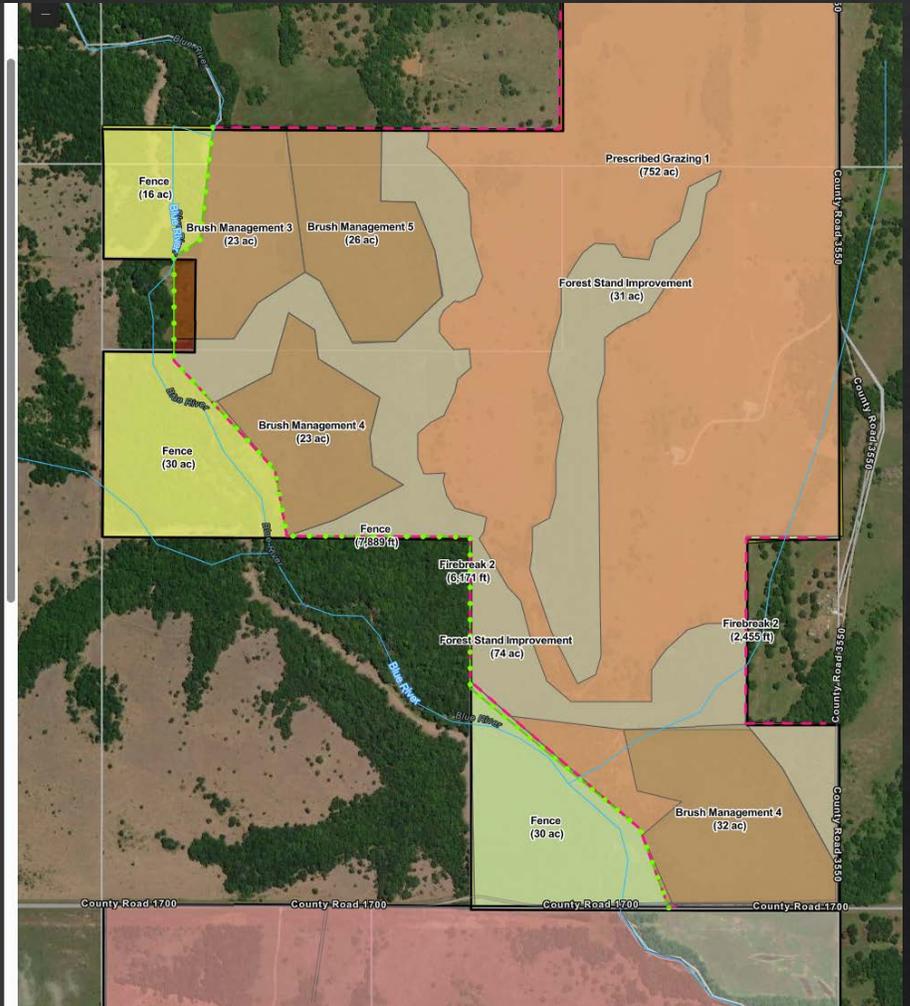
**Project Areas: Blue River Watershed**

Related Record



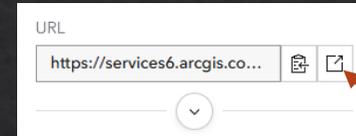
**Conservation Area Unit**

- Brush Management: Chemical Treatment, Broadcast, Aerial or Ground
- Brush Management 1: Individual Plant Treatment Low 50-200 Plant per Acre
- Brush Management 2: Individual Plant Treatment High 201-400 Plants per Acre
- Brush Management 3: Mechanical Treatment for 11-30% Canopy Cover
- Brush Management 4: Mechanical Treatment for 31-50% Canopy Cover
- Brush Management 5: Mechanical Treatment for >50 % Canopy Cover
- Cover Crop: Growing cover crops during off-season to reduce erosion, improve soil health, and prevent nutrient runoff
- Critical Area Planting: Planting vegetation on eroded or disturbed areas to stabilize soil and protect water quality
- Conservation Cover: Establishing and maintaining permanent vegetative cover - Wp Pollinator species
- Forest Stand Improvement: Competition Control- Hand Tools, Light equipment
- Forest Stand Improvement 1: Competition Control - Mechanical, Heavy Equipment
- Herbaceous Weed Treatment: Chemical application by any method



# Stream AGOL Feature Layer Rest Service API to Microsoft Power BI

◇ View Feature Layer ArcGIS Rest Service Details



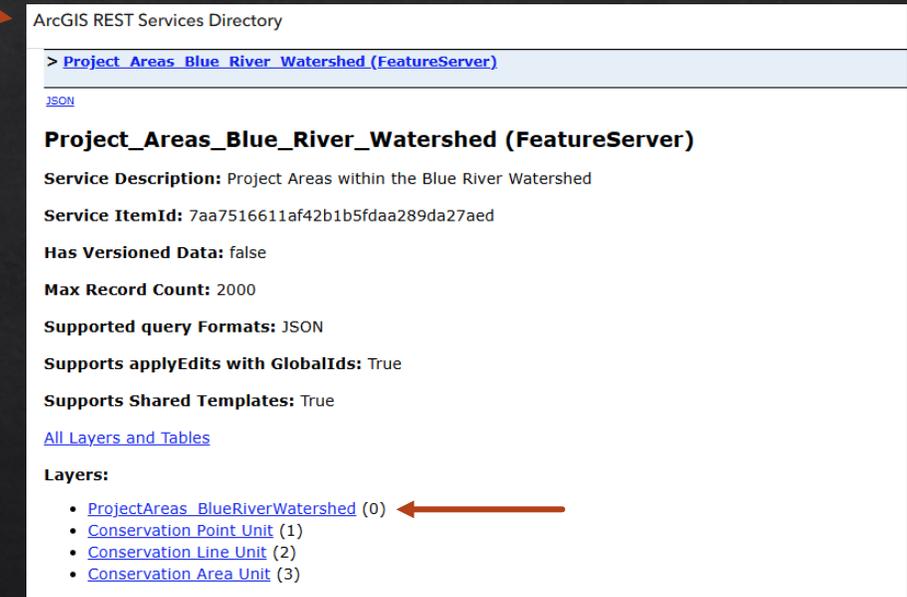
View

◇ Navigate to the Parent Feature Layer

◇ Once selected, click "Query" (open in new tab)



Open in new tab



A screenshot of the ArcGIS REST Services Directory. The page title is 'ArcGIS REST Services Directory'. Below it, there is a breadcrumb trail: `> Project_Areas_Blue_River_Watershed (FeatureServer)`. The main content area shows details for the 'Project\_Areas\_Blue\_River\_Watershed (FeatureServer)'. It includes a 'Service Description', 'Service ItemId', 'Has Versioned Data', 'Max Record Count', 'Supported query Formats', 'Supports applyEdits with GlobalIds', and 'Supports Shared Templates'. At the bottom, there is a 'Layers' section with a list of layers: 

- [ProjectAreas\\_BlueRiverWatershed \(0\)](#)
- [Conservation Point Unit \(1\)](#)
- [Conservation Line Unit \(2\)](#)
- [Conservation Area Unit \(3\)](#)

An orange arrow points from the first layer to the right.

◇ Build a query and generate a JSON

◇ Refer to <https://www.exprodat.com/blog/using-arcgis-rest-services-as-power-bi-data-sources-part-1/>

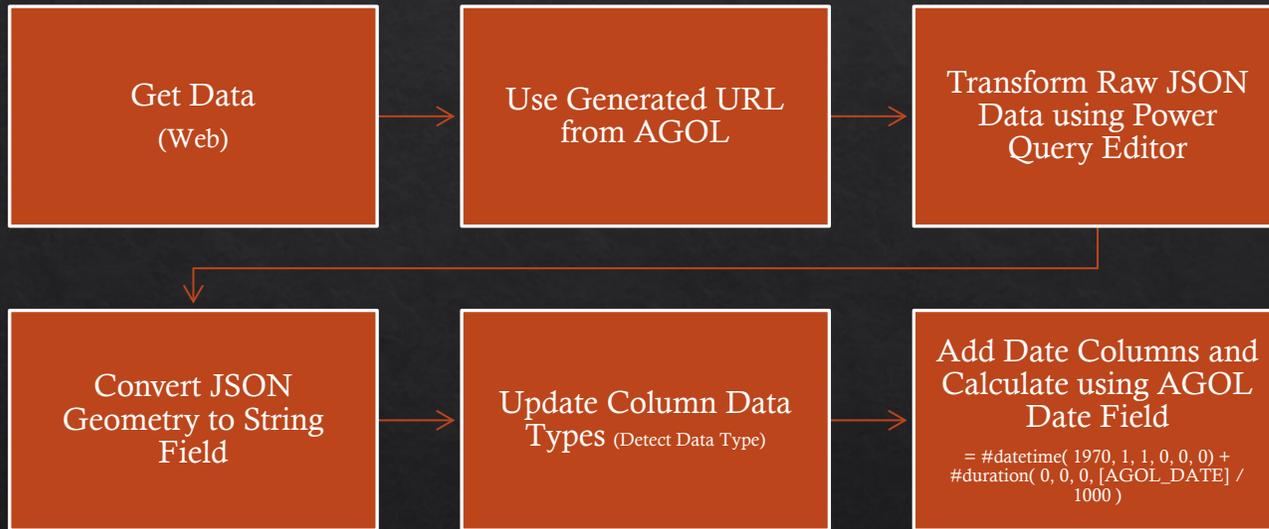
◇ Copy the URL and head over to Power BI!!



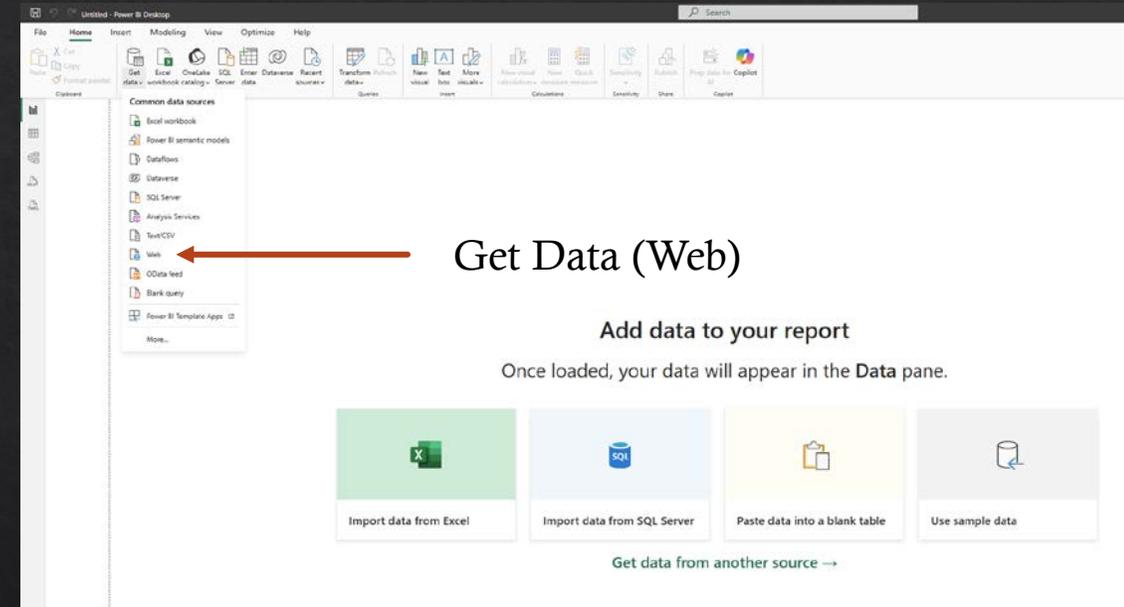
Copy URL

# Use ArcGIS Rest Service as a Data Source in Power BI

Refer to <https://www.exprodat.com/blog/using-arcgis-rest-services-as-power-bi-data-sources-part-1/>



Power BI doesn't know what to do with Geometry fields!



# Create Power BI Reports and Dashboards Using ArcGIS Rest Service Data

◆ “Close and Apply” once data has been successfully imported.

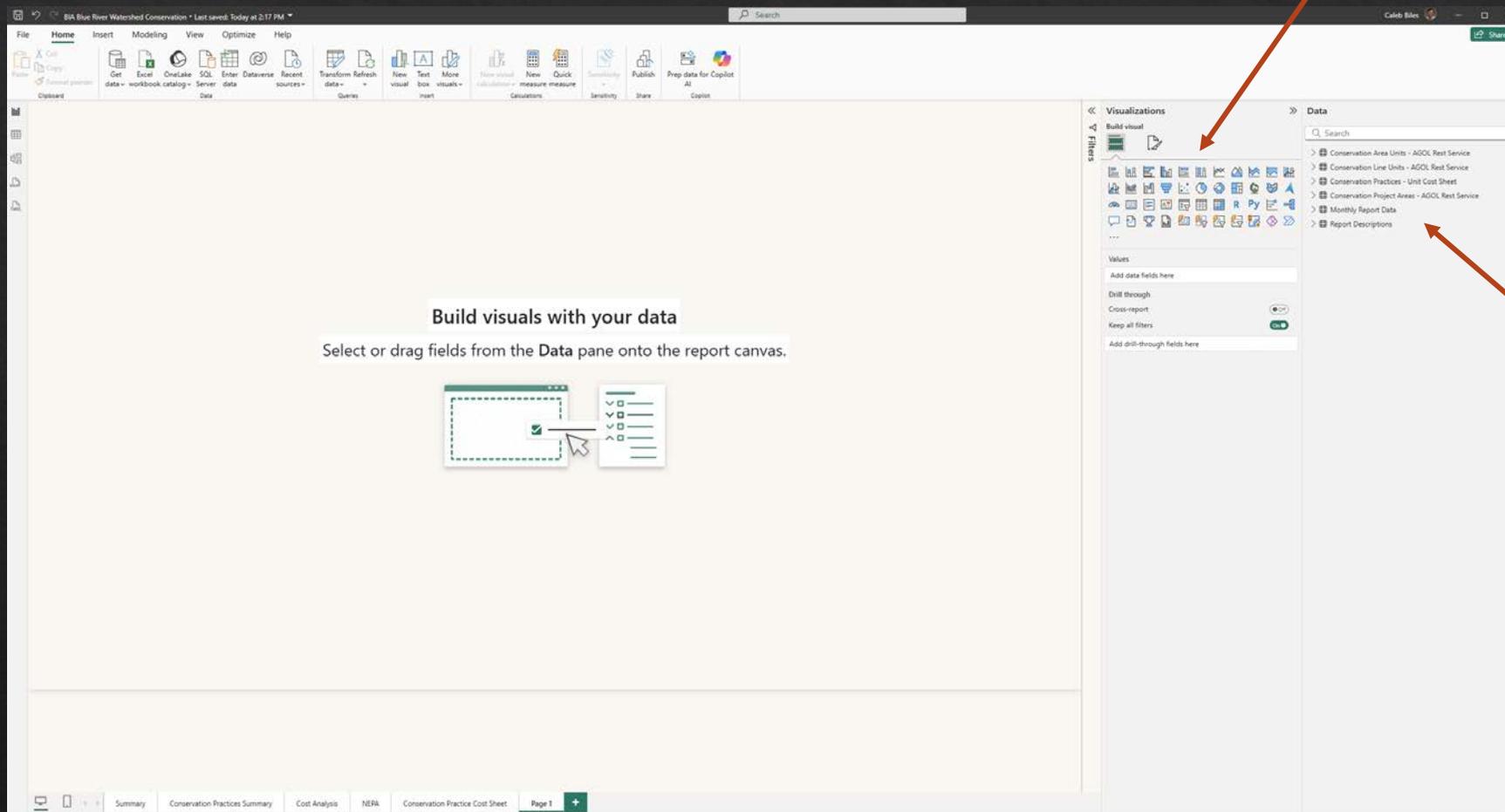
Close and Apply →

OBJECTID	Name	LandOwnerName	PropertyAcres	county	PropertyContactName	PropertyContactNumber	PropertyLegalDescription	WatershedName	PropertyPerimeter	PropertyNotes
1	77 Andy Navid	Andy Navid	80	40089	Andy Navid	580 775-4340	W/2 SW Sec 33-135-R8E	Blue River		
2	25 Arbuskie Plains Easement	The Nature Conservancy	226	Johnston	Haley Bloomquist			Blue River (HUC-8)	14415	
3	21 Betty A. Clark	Betty Clark	2633	Pontotoc				Blue River (HUC-8)	66882	
4	73 Blaine (Troxeil Lease)	Graham Blaine	80	40069	Kyle Troxeil	580-257-9635		Blue River		
5	1 Blue River Public Fishing & Hunting Area (WMA)	Oklahoma Department of Wildlife Conservation	3341	Johnston				Blue River (HUC-8)	96146	
6	13 Blue Springs	CN but Formally Gary Montin	91	Johnston				Blue River (HUC-8)	9144	
7	32 Bruce Turner	Bruce Turner	419	Johnston	Bruce Turner	5809166487		Blue River		
8	71 Bruce Woods	Bruce Woods	161	40069	Bruce Woods	580-371-5180		Blue River		
9	3 Buxton Horseshoe Ranch LLC	Buxton Horseshoe Ranch LLC	4072	Pontotoc	Carlyle Hill	580-310-4938		Blue River (HUC-8)	68279	
10	61 Cain Cattle	Josh Cain	1037	40069	Josh Cain	5806770410		Blue River		
11	55 Cain Cattle	Josh Cain	1703	40069	Josh Cain	5806770410		Blue River		
12	29 Carruth Property	Raymond Carruth	551	Johnston	Raymond Carruth	5803878666		Blue River		
13	12 Chickasaw White House	CN	55	Johnston				Blue River (HUC-8)	8782	
14	2 City of Ada - Byrds Mill Spring	City of Ada	2387	Pontotoc				Blue River (HUC-8)	125615	
15	23 Coffey Ranch	Coffey Ranch LTD	3038	Johnston				Blue River (HUC-8)	76663	
16	17 Cole	Dakota Cole	146	Johnston				Blue River (HUC-8)	11779	
17	48 Corbin (Vandever Lease)	William Corbin	2021	Johnston	Mike Vandever	580-513-1288		Blue River (HUC-8)	55706	
18	14 Cravat	BIA Trust	302	40069				Blue River (HUC-8)	38532	
19	44 Dilday (Vandever Lease)	Mike Vandever	76	40069	Mike Vandever	580-513-1288		Blue River		
20	38 Drew Armstrong	Drew Armstrong	154	40069	Drew Armstrong	2147148698		Blue River		
21	41 Eddie Easterling	Eddie Easterling	262	40069				Blue River		
22	59 Ferris (Cain Lease)	Ferris Johnson/Mary Green	604	40069	Josh Cain	5806770410		Blue River		
23	45 Golden (Vandever Lease)	Troy Golden	228	90089	Troy Golden	580-387-8833		Blue River		
24	9 Gregory Loper	Gregory Loper	160	Johnston	Greg Loper/Miko Brandon	4054431707		Upper Blue River	20382	
25	27 Gregory Loper	Gregory, Clarice c/o Te'Ata Loper	80	Johnston			SEC 21 T35 R7E	Blue River (HUC-8)	7954	
26	67 Harbert	Luther Harbert	446	40069	Luther Harbert	580-371-5331		Blue River		
27	57 Harbert (Cain Lease)	Luther Harbert	444	40069	Josh Cain	5806770410		Blue River		
28	15 Howell	Matt and Colin Howell	162	Johnston	Matt Howell	972834731		Blue River (HUC-8)	20654	
29	62 Howell (Cain Lease)	Howell	80	40069	Josh Cain	5806770410		Blue River		
30	68 Ingram(Harbert lease)	Jay Ingram	132	80068	Luther Harbert	5803715331		Blue River		
31	42 Jeff Caskey	Jeff Caskey	84	40089	Jeff Caskey	5803727889		Blue River		
32	47 Jerry Lamb	Jerry Lamb	672	40123	Jerry Lamb	580-399-0261		Blue River		
33	65 Jeter (Cole Lease)	Joni Jeter	811	40069	Raye Lynn Cole	580-371-5468		Blue River		
34	7 John Moody	John D. Moody	393	Johnston		5122894676		Blue River (HUC-8)	26076	
35	60 Johnson (Cain Lease)	Tommy Johnson	38	40069	Josh Cain	5806770410		Blue River		
36	36 Julie Jones	Julie Jones	138	Johnston	Julie Jones	2812530045		Blue River		
37	72 Kyle Troxeil	Kyle Troxeil	219	40069	Kyle Troxeil	580-257-9635		Blue River		
38	49 Martin (Harbert Lease)	Blake Martin	22	40069	Luther Harbert	5803715331		Blue River		

# Create Power BI Reports and Dashboards Using ArcGIS Rest Service Data

- ◆ Begin creating dashboards with imported data

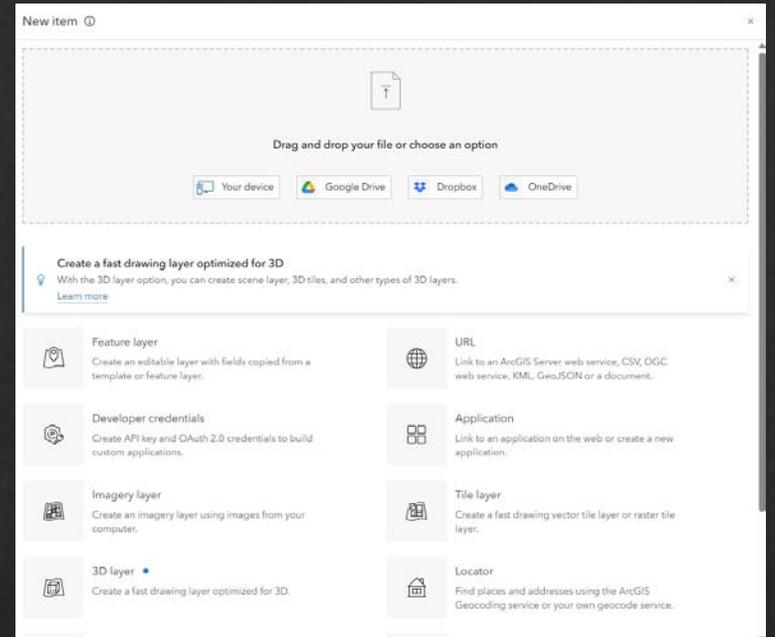
Visualizations



All datasets

# Establish API Key Credentials in AGOL

- ❖ By default, AGOL tokens are extremely temporary.
- ❖ Generate an API Key Credential to extend the token for up to 1 year.
- ❖ Once generated, Use the Advanced Editor in Power Bi to update the Rest Service Feature Layer API token.



Token portion  
Of URL

returnQueryGeometry=false&returnDistinctValues=false&  
token=AAPTxy8BH1VEsoebNVZXo8HurD8Q2erEUmDp7iEJevLHAou

# Embed Power BI Dashboards and Reports to Experience Builder or other development website

The screenshot shows a Power BI report interface. The title bar reads "BIA Blue River Watershed Conservation" and "Data updated 10/31/25". The report title is "BIA Blue River Habitat Restoration | Monthly Report" with sub-headers "Report Date: October 27, 2025 | Project End Date: December 2026". A context menu is open over the "Embed report" option. The report content includes several tables and sections:

OAKS AND PRAIRIES JOINT VENTURE		
Planned and Completed Spending	OKA Planned and Completed Spending	OPJV Planned and Completed Spending
222,998	\$1,492,271	\$730,727
TOTAL Acres with Management Plans	OKA Acres	OPJV Acres
25,068	12,815	12,253
TOTAL Linear Feet with Management Plans	OKA Linear Feet	OPJV Linear Feet
243,329	123,197	120,132

INVOICING		
TOTAL INVOICES PAID	OKA	OPJV
\$14,813	\$1,654	\$13,159

FUNDS REMAINING	
NEPA	CONSERVATION
18,971	Initial Balance of \$3M \$777,002

OAKS AND PRAIRIES JOINT VENTURE	
<b>General Status Update</b>	<b>Issues and Concerns</b>
Still meeting with new producers and enrolling projects. Updated Chaylum with a priority list of projects for NEPA clearances??	Will the remaining balance for NEPA funds be enough to spend the rest of the ~700k?

OKA INSTITUTE	
<b>General Status Update</b>	<b>Issues and Concerns</b>
I am aware of two contracts with work underway that were close to being completed. These will need certification and payment soon. We feel we have the vendor info with ECU in place. We feel the Oka part will be efficient.	

Embed report

Securely embed this report in a website or portal

Set up your link

Enable action bar  Enable Copilot ⓘ

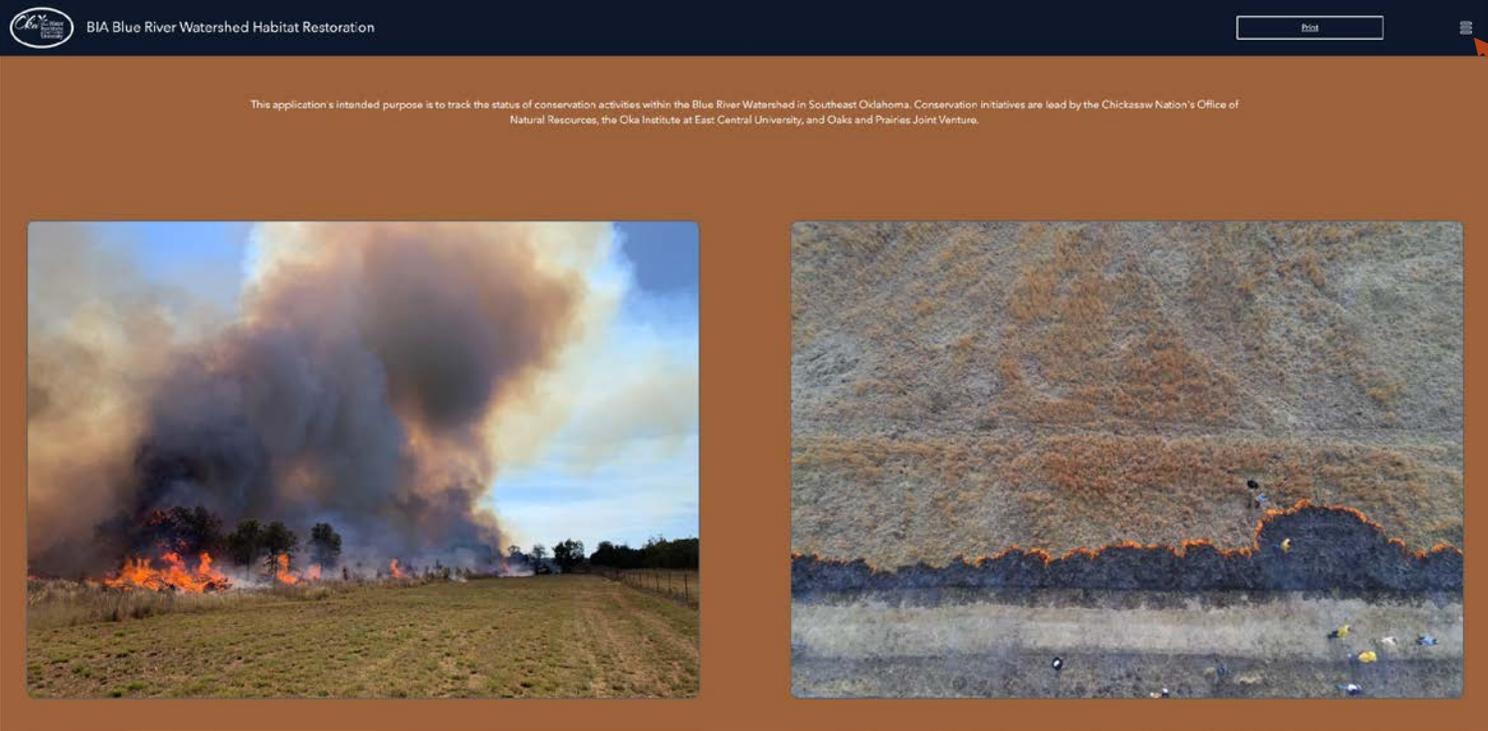
Link to embed this content

HTML to paste on a website

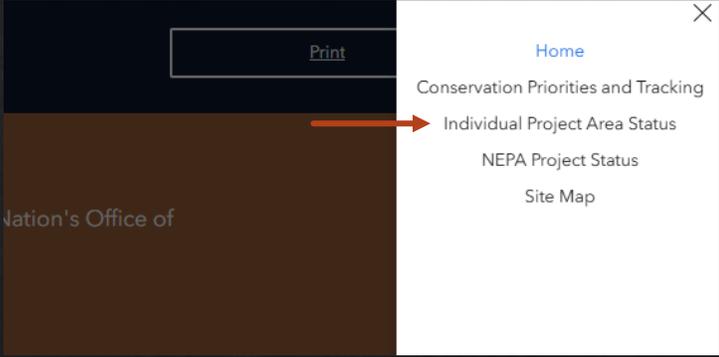
Changing the width or height from what is specified in the iframe code above may result in certain features not working as expected.

[Explore more embedding options in our Power BI embedded analytics playground](#)

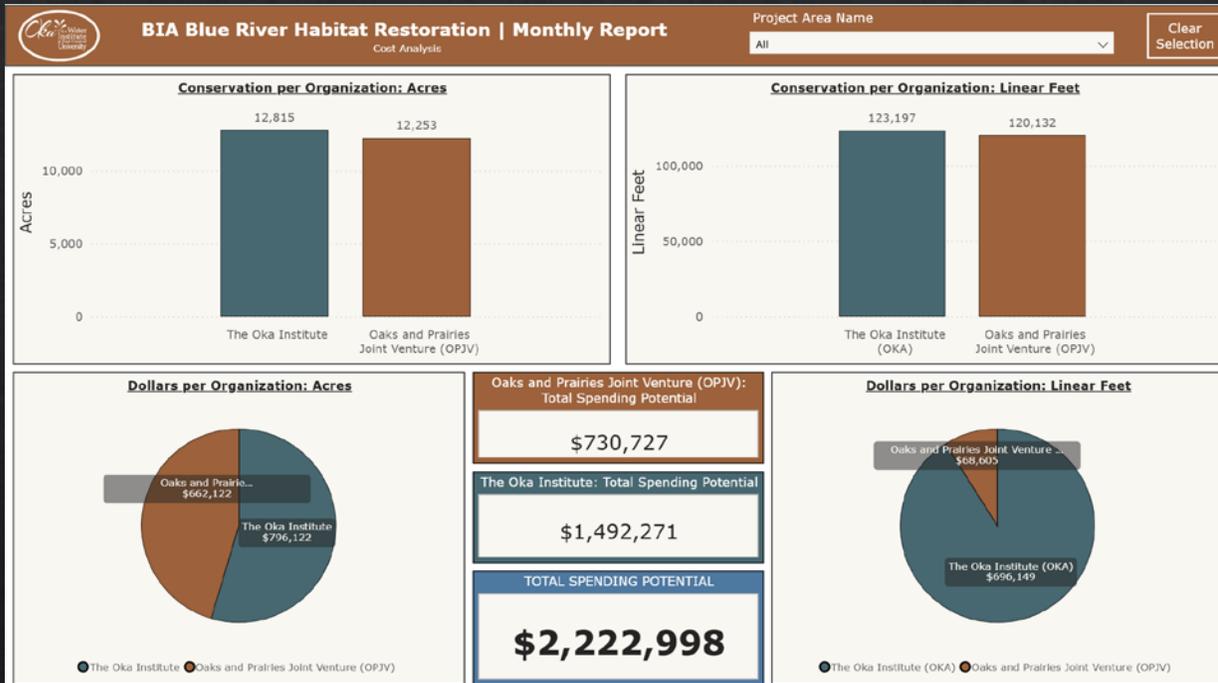
# Embed Power BI Dashboards and Reports to Experience Builder or other development website



Menu



# Example of Power BI Dashboard



# Example of AGOL Dashboard

Upper Blue River Watershed - Conservation Priorities
Select a Project Area  
No category selected
☰

**Conservation Implementation Initiatives**

**Conservation Line Unit**

- Fence: Excluding livestock and other animals from sensitive areas to prevent contamination and physical damage.
- Firebreak: Constructed - Slight Slopes with Light Equipment (e.g. mowing or brush hogging)
- Firebreak 1: Constructed - Moderate Slopes with Medium Equipment (e.g. bladed line)
- Firebreak 2: Constructed - Steep Slopes with Medium Equipment (e.g. clearing significant timber)
- Firebreak 3: Re-Construct Firebreaks where prior firebreaks existed, and they are not suitable.
- Use Exclusion

**Conservation Area Unit**

- Brush Management: Chemical Treatment, Broadcast, Aerial or Ground
- Brush Management 1: Individual Plant Treatment Low 50-200 Plants per Acre
- Brush Management 2: Individual Plant Treatment High 201-400 Plants per Acre
- Brush Management 3: Mechanical Treatment for 11-30% Canopy Cover
- Brush Management 4: Mechanical Treatment for 31-50% Canopy Cover
- Brush Management 5: Mechanical Treatment for >50% Canopy Cover
- Cover Crop: Growing cover crops during off-season to reduce erosion, improve soil health, and prevent nutrient runoff
- Critical Area Planting: Planting vegetation on eroded or disturbed areas to stabilize soil and protect water quality
- Conservation Cover: Establishing and maintaining permanent vegetative cover - Wp Pollinator species
- Forest Stand Improvement: Competition Control - Hand Tools, Light equipment
- Forest Stand Improvement 1: Competition Control - Mechanical, Heavy Equipment
- Herbaceous Weed Treatment: Chemical application by any method
- Nutrient Management: Nutrient management non-organic
- Pest Management Conservation System: Managing pest control methods to reduce the need for chemical pesticides, protecting water sources
- Prescribed Burning: Prescribed fire any

**Total Planned and Completed Spending**

\$2,364,862

**Total Invoices Paid**

\$31,751

**Conservation Acres**

Practice Type	Acres
Prescribed Burning	11,000
Brush Management	9,500
Prescribed Grazing 1	2,500
Herbaceous Weed Treatment	2,000
Brush Management 5	1,500
Fence	1,000
Brush Management 4	1,000
Prescribed Grazing 4	1,000
Forest Stand Improvement	1,000
Cover Crop	1,000
Range Planting	1,000
Brush Management 2	1,000
Conservation Cover	1,000
Brush Management 3	1,000
Critical Area Planting	1,000
Brush Management 1	1,000

**Conservation Acres**

Total Acres with Management Plan

25,405 acres

**Conservation Linear Feet**

Completed

865 acres

**Conservation Linear Feet**

Total Linear Feet with Management Plan

246,270 ft

**Conservation Linear Feet**

Complete

None

**Conservation Linear Feet**

Linear Practice Type	Linear Feet
Firebreak 2	90,000
Fence	60,000
Firebreak	50,000
Use Exclusion	40,000
Firebreak 1	10,000

Home
Conservation Priorities and Tracking
Individual Project Area Status
NEPA Project Status
Site Map
Print

# AGOL Dashboards vs. Power BI

**Integration with GIS data:** ArcGIS is specifically designed for Geographic Information System (GIS) data and provides advanced mapping and spatial analysis capabilities. It supports various data formats, such as shapefiles and geodatabases, allowing users to create and manipulate geographic data. Power BI, on the other hand, can integrate with ArcGIS Online to display maps, but it is not as specialized in GIS data as ArcGIS.

**Data sources:** Power BI is particularly strong in its ability to connect to a wide range of data sources, including spreadsheets, databases, and cloud services. It can pull data from various platforms and perform data transformations before visualization. ArcGIS, on the other hand, focuses more on geospatial data and is capable of integrating with GIS-specific data sources, such as aerial imagery and satellite data.

**Analytical capabilities:** ArcGIS offers a comprehensive suite of spatial analysis tools, including proximity analysis, network analysis, and spatial statistics. These tools allow for in-depth spatial analysis and modeling. Power BI, although it offers some basic analytical capabilities, is primarily focused on visualizing and exploring data rather than performing complex spatial analysis tasks.

**Customization and extensibility:** Power BI provides a user-friendly interface for creating visually appealing dashboards and reports. It offers a wide range of customizable visualizations and allows users to create their own custom visuals using the Power BI visualization SDK. ArcGIS, while it also provides customization options, requires more technical expertise and programming skills to extend its functionality.

**Collaboration and sharing:** Power BI integrates well with Microsoft's collaboration tools, such as SharePoint and Teams, making it easier for teams to collaborate on data visualization projects. It also allows for easy sharing of reports and dashboards both within the organization and externally. ArcGIS, on the other hand, provides its own collaboration platform, ArcGIS Online, which allows users to share and collaborate on maps and spatial data specifically.

**Cost:** Power BI comes with different pricing plans, including a free version with limited features and paid plans with additional capabilities. It offers flexibility in terms of pricing based on the organization's needs and budget. ArcGIS, however, tends to be more costly, especially for larger organizations or those with more specialized spatial analysis requirements, as it offers a wider range of advanced spatial analysis capabilities.

# Thank you!

- ◇ Caleb Biles | GIS Analyst | Oka Water Institute at East Central University
- ◇ Email: [callbil@ecok.edu](mailto:callbil@ecok.edu)
- ◇ Cell: 405-606-9734

