

Federal Geospatial Platform Training

Visualizing Time-Series Data Using FGP Plugins

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What you are going to learn...

Time-Series Data and Visualization

- ✓ What are times series data
- ✓ Types of time series visualization

Visualize Time-Series Data Using FGP Plugins

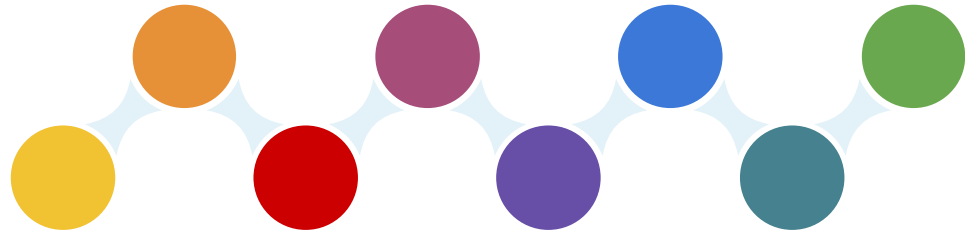
- ✓ Plugins and making the right choices
- ✓ Configuring plugins

FGP Authoring Tool for Interactive Plugin Configuration

- ✓ FGP Authoring Tool
- ✓ Use case demo



Time-Series Data And Visualization



What is Time-Series data?

- ✓ **Time-Series data**, in general, refers to a sequence of data collected over time intervals, giving us the ability to track changes over time.
- ✓ **Time-Series data** in this training refers to Time-Series **in a spatial context** (i.e. spatio-temporal data) that
 - ✓ Tracks changes in fixed locations, such as monitoring stations
 - ✓ Represents spatially-varying changes via a series of maps (e.g. temperature maps)



A Context For Time-Series Data

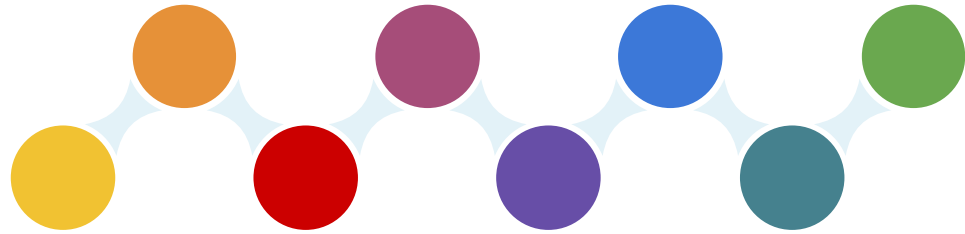
“

Cumulative effects also referred to as cumulative impacts can be defined as changes to the environment caused by the combined impact of past, present, and future human activities and natural processes

”



Forms of Time Series Data Visualization



Time-Series Visualization: Animation

Animations are an interesting way of visualizing Time-Series data



Map Showing: Time-Series Animation of Maximum Temperature Values (2013–2020)
Data Source: [Metadata](#)



Time-Series Visualization: Charts

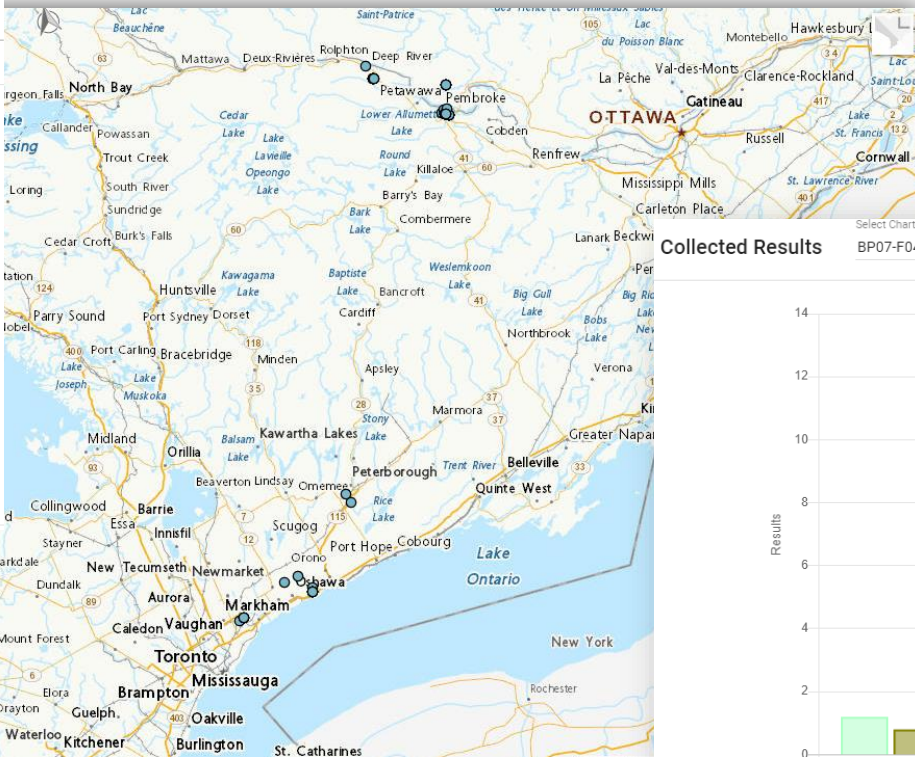
Charts are an effective ways to visualizing Time-Series data

Details

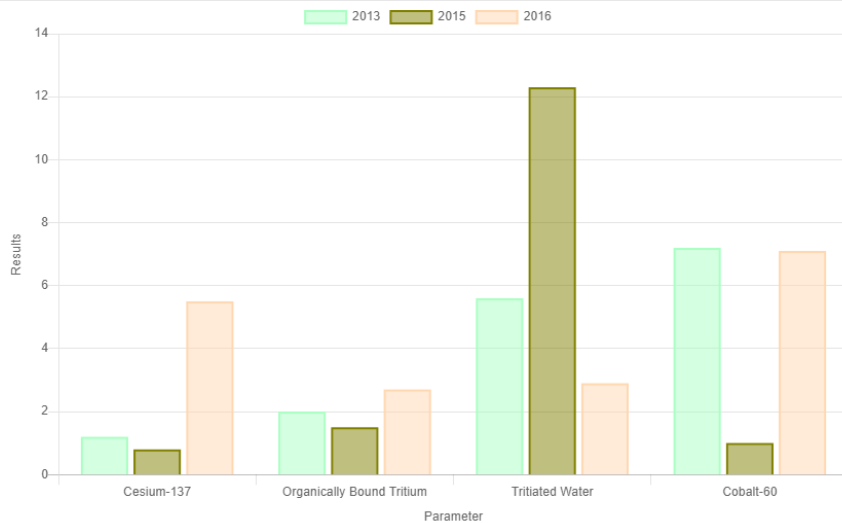
FoodStuff Sample

77

OBJECTID	4
FID	77
sample_cod	BP07-F04
longitude	-85
latitude	47
year	201320152016
parameter	Cesium-137Organically Bound TritiumTritiated WaterCobalt-60
result	[1.225,67.2][0.81,512.31][5.52,72.97,1]
sample_type	Foodstuffs
facility	Bruce A and B Nuclear Generating Stations
sample_Lc	1
ID_FILE	77

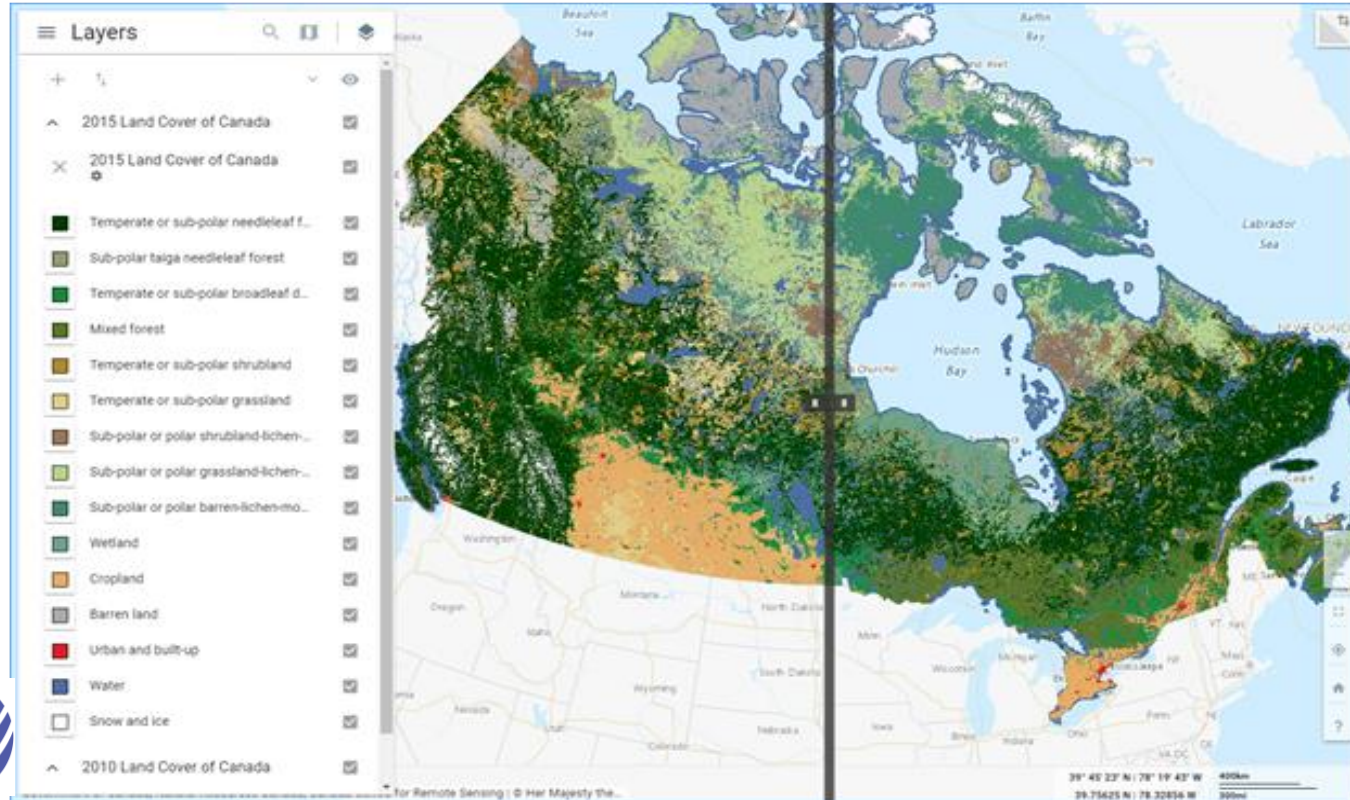


Collected Results BP07-F04



Time-Series Visualization: Change Detection

Change detection is another way to visualize changes



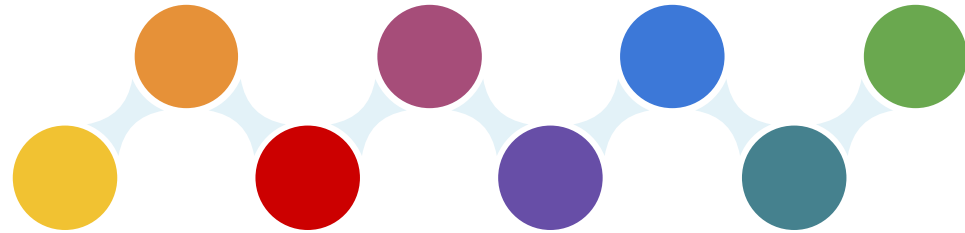
Map Showing

Land Cover of
Canada (2010 & 2015)

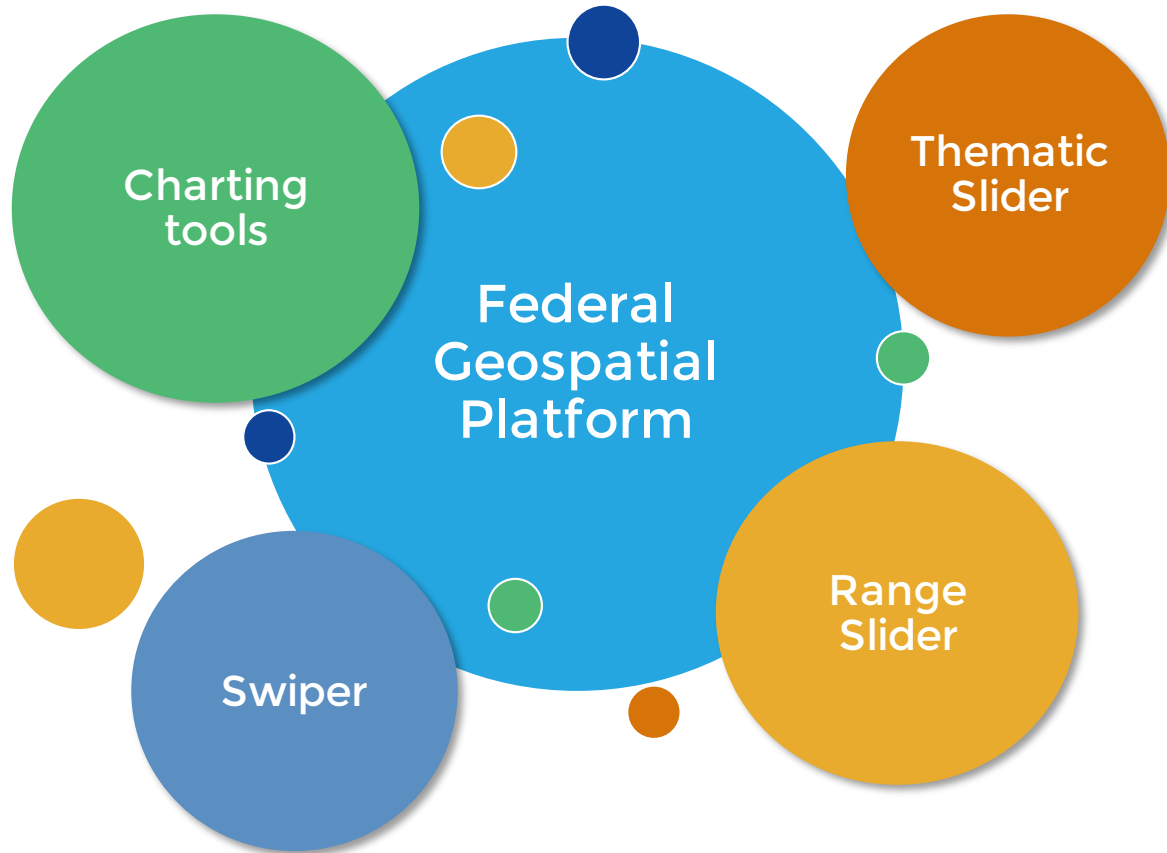
Data Source:
Metadata



Visualize Time-Series Using FGP Plugins



Time-Series Plugins Integrated With FGP

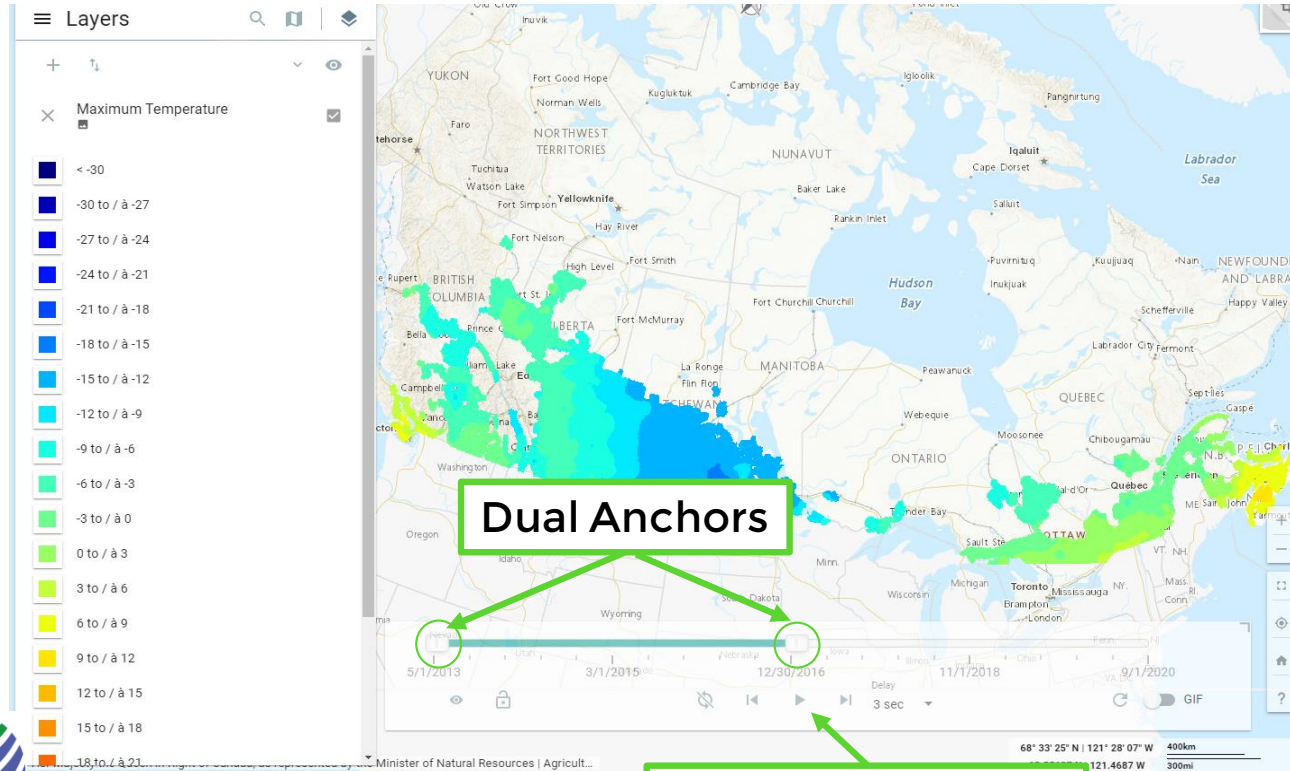


Deciding Which Plugin Suits Your Data

Plugin	Range Slider	Thematic Slider	Charting Tools		Swiper
Mode of Visualization	Animation	Animation	Line Chart	Bar Chart	Swipe Bar
Data Structure	Single Layer with Date/Time attribute field	Multiple map layers, each for a time stamp	Single Layer with time-series data table (E.g. Monitoring Stations or Watersheds)		Multiple map layers
Number of time points	Single Layer	Multiple Layers	Multiple records of time-series data	Few records of time-series data	Multiple Layers
Compatibility	<ul style="list-style-type: none"> • ESRI Feature • ESRI Dynamic • ESRI Image • OGC WMS • OGC WMS-T 	<ul style="list-style-type: none"> • ESRI Feature • ESRI Dynamic • ESRI Image • OGC WMS 	<ul style="list-style-type: none"> • ESRI Feature • ESRI Dynamic 	<ul style="list-style-type: none"> • ESRI Feature • ESRI Dynamic • ESRI Image • OGC WMS 	

Range Slider Plugin

An animation product example



Features

- The ability to export animation as a GIF.
- Granular control over the time increment
- Lock or unlock the anchors when step or play

Map Showing

Maximum Temperature Values (2013-2020)

Data Source:
Metadata



Configuring The Range Slider

Data Structure

Single Layer

- + With Date/Time attribute field

Fields:

- OBJECTID (type: esriFieldTypeOID , alias: OBJECTID)
- Shape (type: esriFieldTypeGeometry , alias: Shape)
- Name (type: esriFieldTypeString , alias: Name , length: 200)
- MinPS (type: esriFieldTypeDouble , alias: MinPS)
- MaxPS (type: esriFieldTypeDouble , alias: MaxPS)
- LowPS (type: esriFieldTypeDouble , alias: LowPS)
- HighPS (type: esriFieldTypeDouble , alias: HighPS)
- Category (type: esriFieldTypeInteger , alias: Category , Coded Values: [0: U
- Tag (type: esriFieldTypeString , alias: Tag , length: 100)
- GroupName (type: esriFieldTypeString , alias: GroupName , length: 100)
- ProductName (type: esriFieldTypeString , alias: ProductName , length: 100)
- CenterX (type: esriFieldTypeDouble , alias: CenterX)
- CenterY (type: esriFieldTypeDouble , alias: CenterY)
- ZOrder (type: esriFieldTypeInteger , alias: ZOrder)
- Shape_Length (type: esriFieldTypeDouble , alias: Shape_Length)
- Shape_Area (type: esriFieldTypeDouble , alias: Shape_Area)
- dStart (type: esriFieldTypeDate , alias: dStart , length: 8)
- tType (type: esriFieldTypeString , alias: tType , length: 10)



Configuring The Range Slider

Parameters

- Enable
- Open by default
- Start animation on load
- Play the animation in loop

Slider bar controls

- Lock/unlock minimal range
- Loop animation
- Delay between animation
- Export animation as Gif
- Refresh

Parameters

Slider Type

Number

If the Date or WMS-T is selected, range and limit must be in milliseconds. Note: Date is for esri layer and WMS-T is for ogc WMS-T layer.

Range Type

Dual

Type of range (single for one handle or dual for 2 handles).

Step Type

Dynamic

Type of step (dynamic for open values or static from a list of values).

Precision

0

Precision of numeric data (0, 1, 2) or date (Date, Hour).

Animation Delay

3 sec

Delay between animations.



Configuring The Range Slider

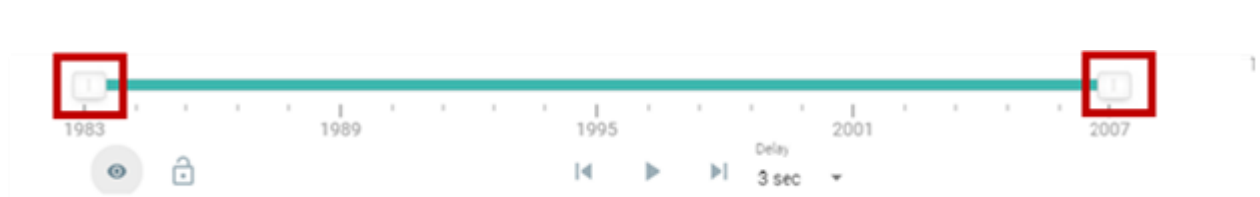
Parameters

Range Type

a) **Single:** Only displays one anchor, which is used to set single ranges



b) **Dual:** Displays a left and right anchor. This allows for a range to be set using both anchors



Thematic Slider Plugin

An animation product example

Features

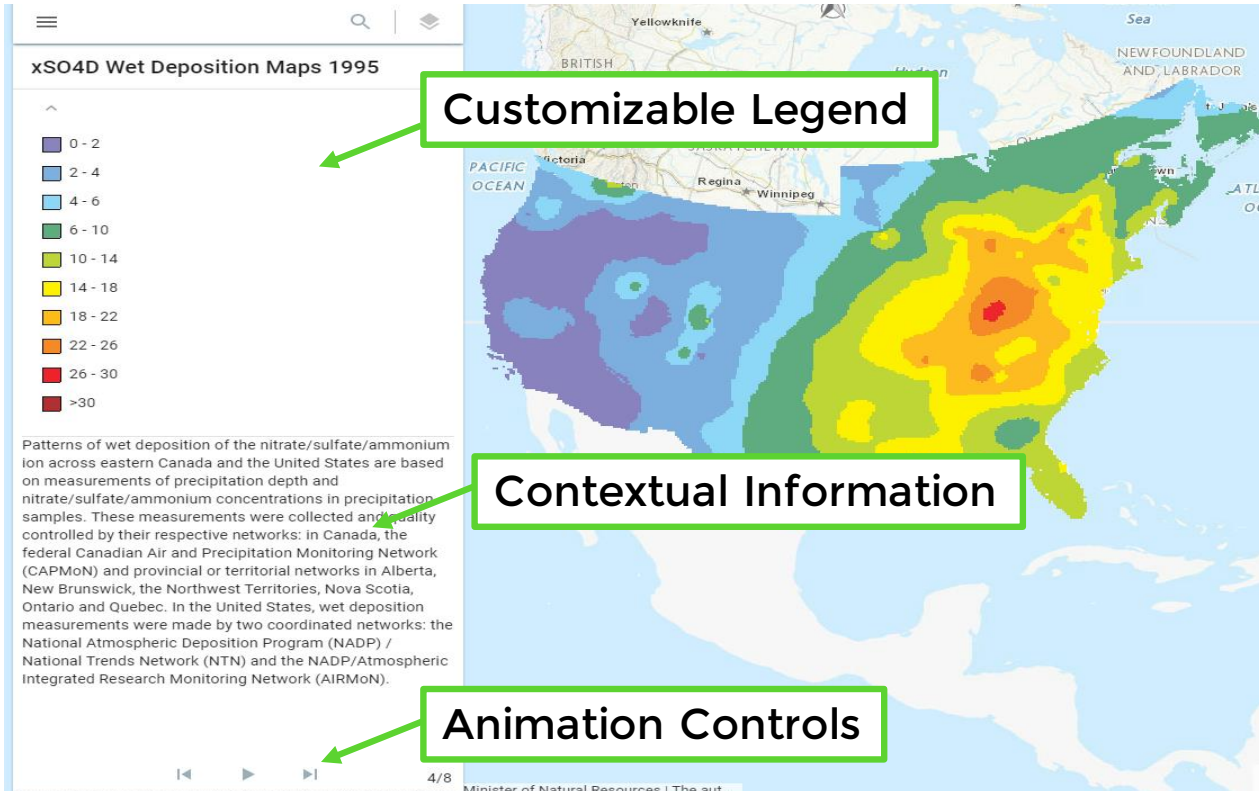
- Customizable Legend\
- Contextual Information area
- Animation control bar

Map Showing

Patterns of wet deposition across Canada and the United States

Data Source:
[Metadata](#)

17



Configuring The Thematic Slider

Data Structure

Multiple Layers

- + Each representing an individual period

Layers:

- [xSO4D](#) (0)
 - [xSO4 Deposition 1981](#) (1)
 - [xSO4 Deposition 1982](#) (2)
 - [xSO4 Deposition 1983](#) (3)
 - [xSO4 Deposition 1984](#) (4)
 - [xSO4 Deposition 1985](#) (5)
 - [xSO4 Deposition 1986](#) (6)
 - [xSO4 Deposition 1987](#) (7)
 - [xSO4 Deposition 1988](#) (8)
 - [xSO4 Deposition 1989](#) (9)
 - [xSO4 Deposition 1990](#) (10)
 - [xSO4 Deposition 1991](#) (11)
 - [xSO4 Deposition 1992](#) (12)
 - [xSO4 Deposition 1993](#) (13)
 - [xSO4 Deposition 1994](#) (14)
 - [xSO4 Deposition 1995](#) (15)
 - [xSO4 Deposition 1996](#) (16)
 - [xSO4 Deposition 1997](#) (17)
 - [xSO4 Deposition 1998](#) (18)
 - [xSO4 Deposition 1999](#) (19)
 - [xSO4 Deposition 2000](#) (20)
 - [xSO4 Deposition 2001](#) (21)
 - [xSO4 Deposition 2002](#) (22)
 - [xSO4 Deposition 2003](#) (23)
 - [xSO4 Deposition 2004](#) (24)
 - [xSO4 Deposition 2005](#) (25)
 - [xSO4 Deposition 2006](#) (26)
 - [xSO4 Deposition 2007](#) (27)
 - [xSO4 Deposition 2008](#) (28)
 - [xSO4 Deposition 2009](#) (29)
 - [xSO4 Deposition 2010](#) (30)
 - [xSO4 Deposition 2011](#) (31)
 - [xSO4 Deposition 2012](#) (32)
 - [xSO4 Deposition 2013](#) (33)
 - [xSO4 Deposition 2014](#) (34)
 - [xSO4 Deposition 2015](#) (35)
 - [xSO4 Deposition 2016](#) (36)



Configuring The Thematic Slider

Parameters

- Enable
- Open by default
- Start animation on load
- Play the animation in loop
- Enable slider control
- Stack layer visibility
- Stack legend items (useful with the stack option to see all active elements legend)

ID ✕

The id of the layer for referencing within the viewer (does not relate directly to any external service).

Animation duration in milliseconds

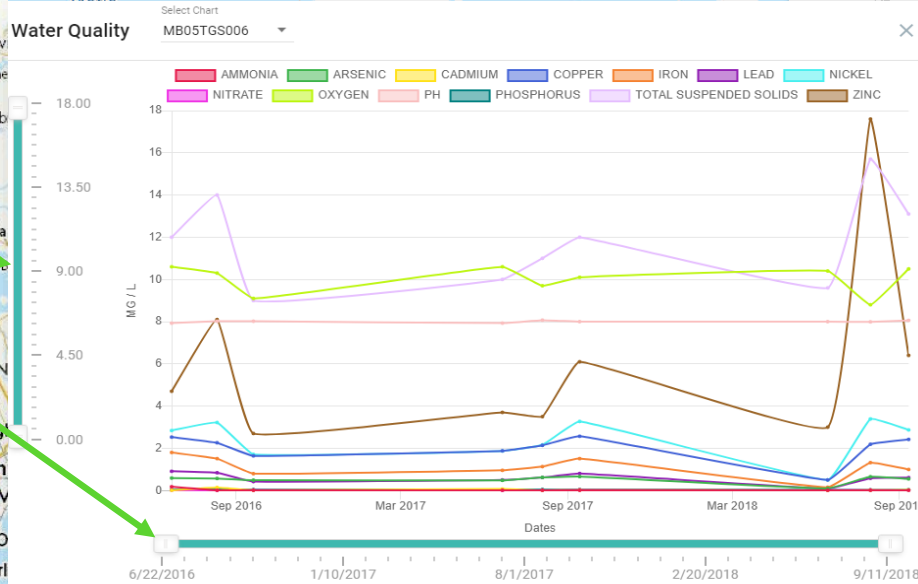
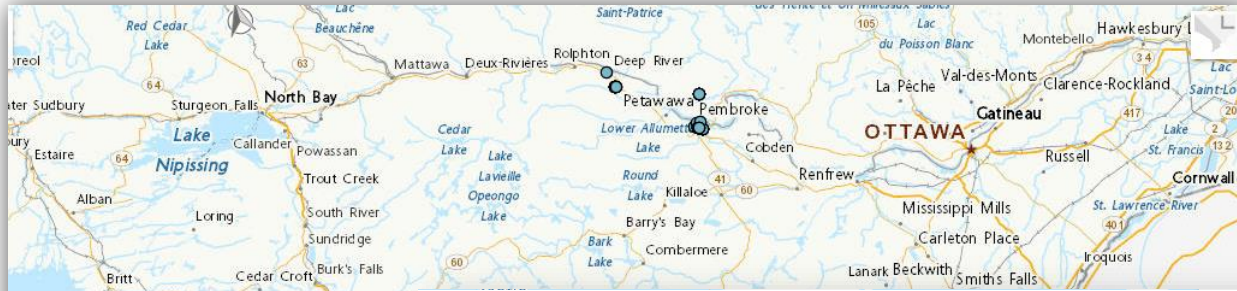
 ✓

Title for this layer animation



Charting Plugin

A line chart example



Features

- Line Charts for data with many data points
- Bar charts for data with sparse data points

Map Showing

The Water quality in Canadian rivers indicators provide a measure of the ability of river water across Canada to support plants and animals

Data Source:

[Metadata](#)

Configuring The Charting Plugin

Data Structure

Linked Tables

- + Two or more tables that share a similar field
- + Single table containing all the parameters and values

Water Quality Sites

OBJECTID*	Site number*	Site name	Province	Latitude	Longitude	Drainage region ID	Land use category
10	AB05CD0250	Red Deer River at Nevis Bridge	Alberta	52.38636	-113.07917	11	Low Agriculture

Table

results

OBJECTID*	Site number*	DATE	VARIABLE_NAME	FORM_NAME	FLAG_MARQUEUR	VALUE_VALEUR	UNIT_UNITE
12979	AB05CD0250	2016-01-18	ALUMINUM	Dissolved	=	0.00559	MGL
12980	AB05CD0250	2016-01-18	AMMONIA	Unfiltered	=	0.1	MGL
12981	AB05CD0250	2016-01-18	ARSENIC	Total	=	0.377	UGL
12982	AB05CD0250	2016-01-18	CADMIUM	Total	=	0.016	UGL
12983	AB05CD0250	2016-01-18	COPPER	Total	=	0.62	UGL
12984	AB05CD0250	2016-01-18	LEAD	Total	=	0.074	UGL
12985	AB05CD0250	2016-01-18	MERCURY	Total	=	0.00028	UGL
12986	AB05CD0250	2016-01-18	NITROGEN	Total	=	1.1	MGL
12987	AB05CD0250	2016-01-18	OXYGEN	Dissolved	=	8.72	MGL
12988	AB05CD0250	2016-01-18	PHOSPHORUS	Total	=	0.013	MGL
12989	AB05CD0250	2016-01-18	SELENIUM	Total	=	0.44	UGL
12990	AB05CD0250	2016-01-18	ZINC	Total	=	1.7	UGL
12991	AB05CD0250	2016-02-16	ALUMINUM	Dissolved	=	0.0079	MGL
12992	AB05CD0250	2016-02-16	AMMONIA	Unfiltered	<	0.05	MGL
12993	AB05CD0250	2016-02-16	ARSENIC	Total	=	0.296	UGL
12994	AB05CD0250	2016-02-16	CADMIUM	Total	<	0.002	UGL
12995	AB05CD0250	2016-02-16	COPPER	Total	=	1.04	UGL



Configuring The Charting Plugin

Parameters

Layers

Layer ID

Name Field

Field name to use for the chart selection combo box when multiple charts.

Chart Data Type

Type of data (inline for items inside the layer or link for items inside a link table).

Link URL

URL of the link table.

Link Field

Field name for the link between the layer and the table.

▼ Data

Type of link

How data is structure inside the link table (single for one field for value and one for date OR multi if there is multiple datasets inside one field and the chart needs to parse).

Link Field

Link field to link between layer and table.

Date Field

Field to use for the date

Label Values

Field name to get labels from for link type multi.

Measure Field

Prefix

Prefix to add to data hover.

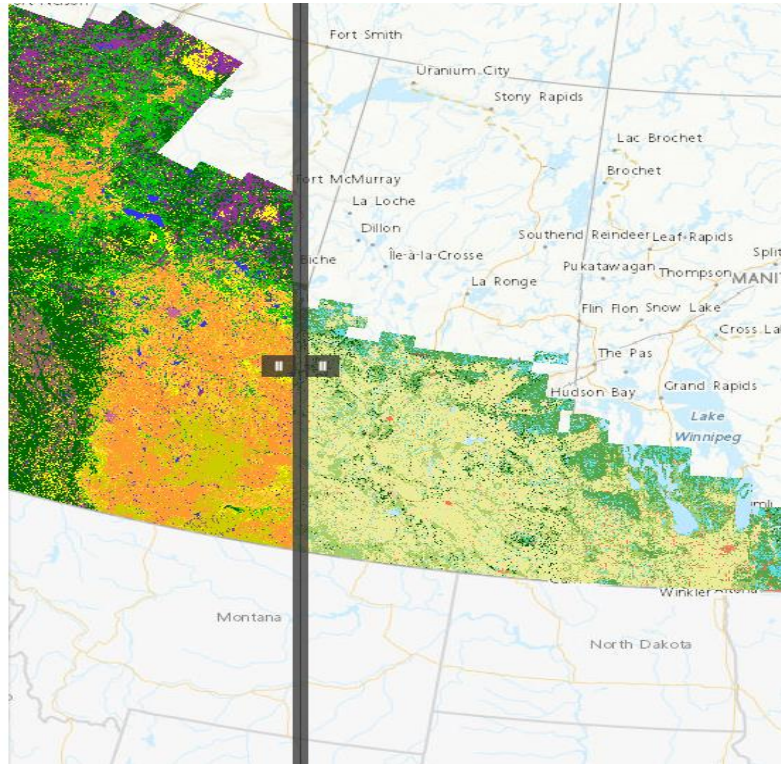
Suffix

Suffix to add to data hover.



Swiper Plugin

Enable Comparisons between layers



Features

- Vertical bar for quick comparisons
- Supports multiple layers

Map Showing

Land cover for
Agricultural Regions for
Canada

Data Source:
[Metadata](#)



Configuring The Swiper Plugin

Parameters

Type

Vertical

Keyboard Movement

10

Pixel value of swiper displacement.

Layers

ID

– No option available –

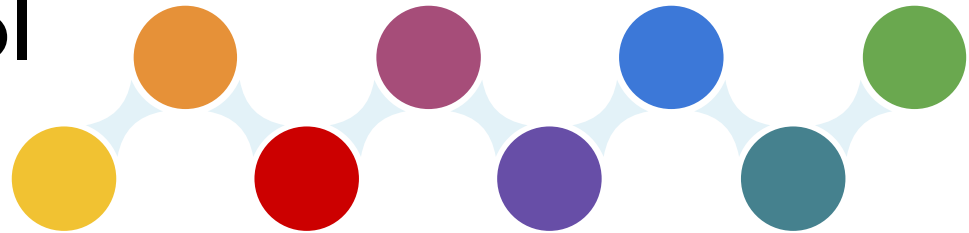
The id of the layer for referencing within the viewer (does not relate directly to any external service).

Required

+ Add



Interactive Plugin Configuration Using FGP Authoring Tool



FGP Authoring Tool

The interface

Templates
? all-plugins-samplesv01 File Name: all-plugins-samplesv01 Version: 3.2.0

Map

UI

Services

Version

Language

Plugins

EXTENSIONS

Map

Show advanced configuration options

Extents and Levels of Detail Basemaps Layers Legend Components

> - *Help - Section information*

Alt-s/Alt-x can also be use to expand or collapse the collection instead of buttons.

Layers Collection

EXPAND COLLAPSE

32

Layer type selector

esriFeature

Name

32

The display name of the layer. If it is not present the viewer will make an attempt to scrape this information.

Summary

VALIDATE EXPAND COLLAPSE

PREVIEW

- > ✓ Map
- > ✓ UI
- > ✓ Services
- > ✓ Version
- > ✓ Language
- > ✓ Plugins

3.2.0 [af64c17]
2021-02-16 16:04:17

fgpv-vpgr/fgpa-apgf

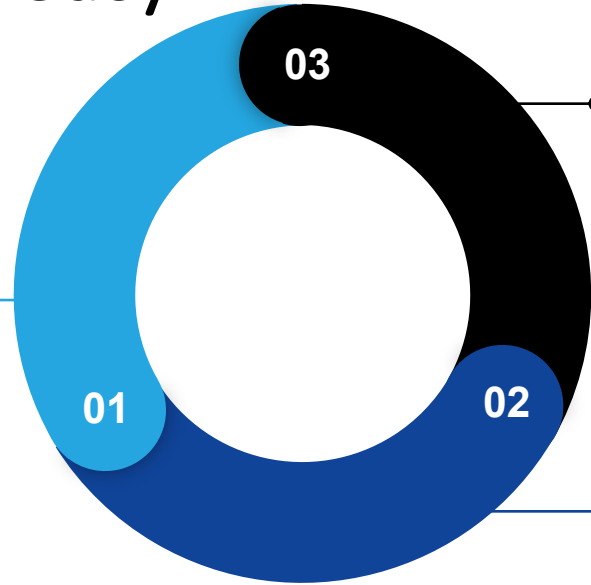


FGP Author Tool

The process is easy

Adding Layers

Provides a sandbox experience where you can load your maps service links to see how they are displayed



Integration and Validation

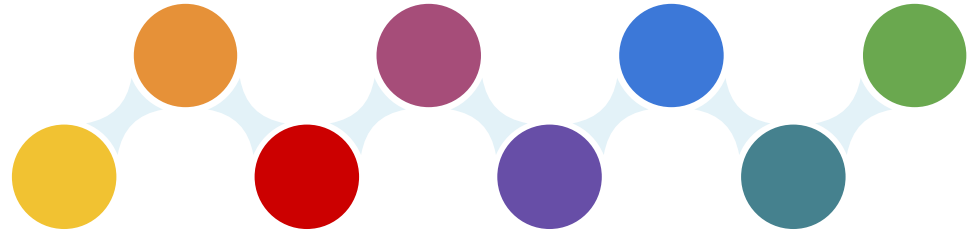
Validate that the plugin works as intended. Save your configuration file as (.json) files or upload previously saved files to make edits

Enable A Plugin

Allows you to quickly enable plugins and configure parameters



More FGP Plugins



More FGP Plugins

Plugin	Area of Interest	Drawing Toolbar	Coordinates Info
Features	<ul style="list-style-type: none"> • Directly points users to the extent indicated • Ability to customize the thumbnail of each Area of Interest • Similar to how bookmarks work with GIS Software 	<ul style="list-style-type: none"> • Draw Points / Lines / Polygons • Edit / Erase created objects • Save / Upload Drawing (.fgpv) • Automatically calculates the length of your lines and the perimeter and area of your polygons 	<ul style="list-style-type: none"> • Geographic Coordinates • UTM Coordinates • National Topographic System Index Maps (NTS) • Provides elevation at any point
Compatibility	All Map Services	All Map Services	All Map Services
More Information	Visit Guidelines	Visit Guidelines	Visit Guidelines



Resources

- ❑ Interactive Guidelines Time-Series Visualization using FGP Plugins
<https://fgpguide.github.io/Guidelines/>
- ❑ To report an issue, please create an issue from the GitHub repository. Add the plugin label and any other applicable information
<https://github.com/fgpv-vpgf/contributed-plugins/issues>
- ❑ For any questions concerning the FGP plugins and authoring tool, please contact
martin.lefebvreauger@nrcan-rncan.gc.ca



Upcoming FGP Training Sessions

- Watch [GCConnex](#) page for upcoming training sessions and [training material](#)
- **Monthly GIS Training Sessions:**
 - Hands-on training for all federal employees to build custom maps and create geospatial data.
 - Dates: French 25-January-22, 10:00-12:00pm / English 25-January-22, 1:00-3:00pm
 - Watch [GCConnex](#) page for upcoming training sessions or [Reserve your seat](#)
- **Creating and Implementing Group Layers:**
 - Why and how to create and implement group layers in the FGP.
 - Date: French 15-February-2022, 1:00-2:30pm / English 16-February-2022, 1:00-2:30pm [Reserve your seat](#)
- **Improving Map Data and Web Services Performance in the FGP:**
 - Best practices to improve the cartographic representation and performance of web services.
 - Date: English 15-March-2022, 1:00-3:00pm / French 22-March-2022, 1:00-3:00pm [Reserve your seat](#)



For More Information

- ❑ Federal Geospatial Platform (FGP) Website
<https://gcgeo.gc.ca>
- ❑ Open Maps Website
<https://open.Canada.ca/en/open-maps>
- ❑ The FGP Contributors Support Services
fgpcontributorsupport-pgfsupportcontributeurs@nrcan-rncan.gc.ca
- ❑ The FGP Client Support Services
fgpservices-servicespgf@nrcan-rncan.gc.ca



Thank You



Demonstration

Integrating the Plugins
with your data!

