How to create an interactive data portal
Part 1: Google Data Studio

This tutorial will teach you how to take time-series data from many field sites and create a shareable online map, where clicking on a field location brings you to a page with interactive graphs. **Part 1 covers how to make interactive graphs in Google Data Studio.**

How to cite:
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What you need to get started

Download the example dataset for this tutorial at **https://tinyurl.com/yxct25p7** or by clicking the button below:

Download dataset here

The example dataset includes minimum and maximum daily air and stream temperatures from four creeks in southeastern Oregon, adapted from a USGS data release: **https://doi.org/10.5066/P924MOCB**

This tutorial can be completed with the example dataset or with your own data. If you are using the example data, download the files and save them locally on your computer.

What you need to get started

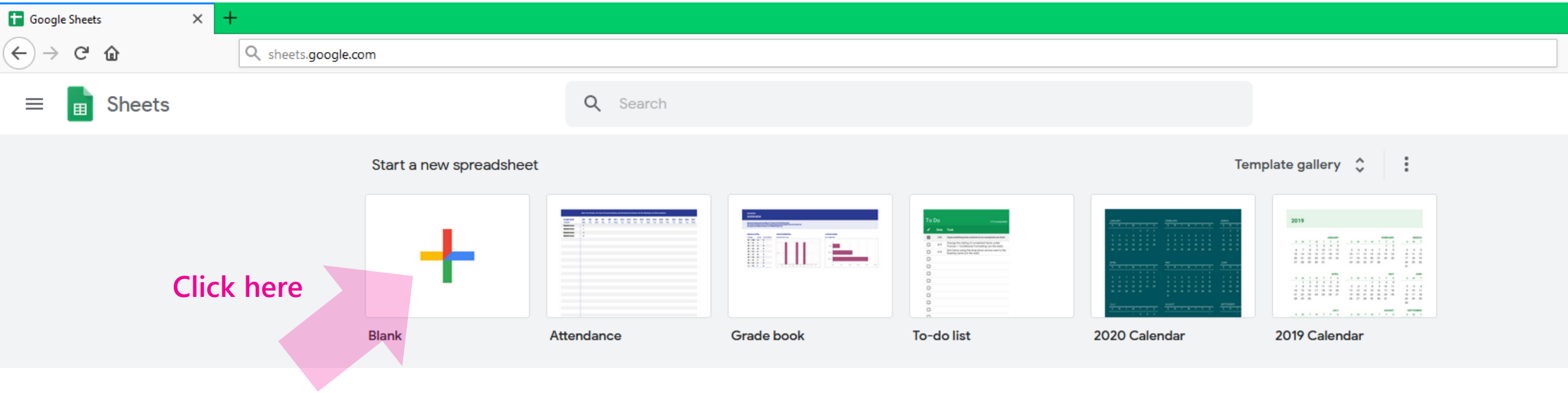
Whether you are working with your own data or the example dataset, for Part 1 you will need:

1. Time-series data from multiple locations (ExampleTimeSeriesData.xlsx)

2. A Google account

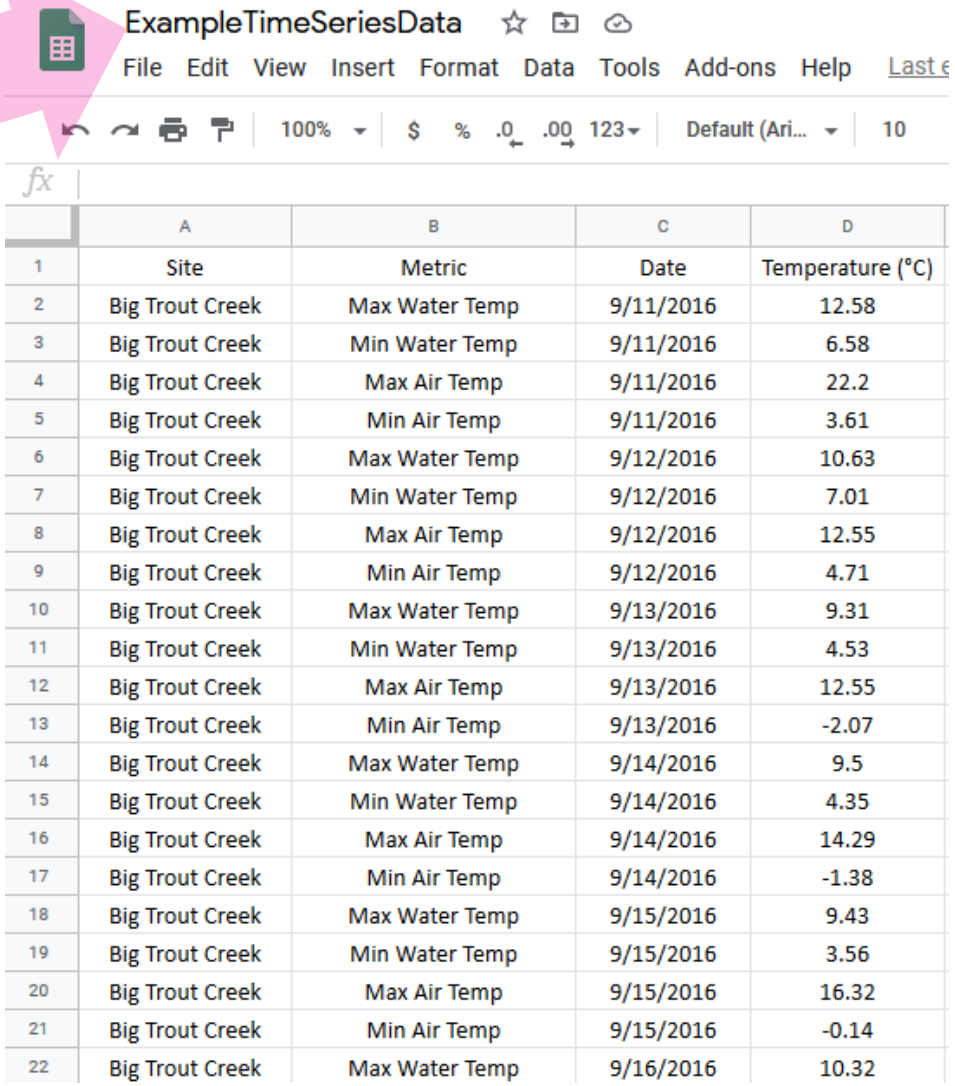
Step 1: Organize data in Google Sheets

Go to sheets.google.com and create a new Google Sheets document.



Step 1: Organize data in Google Sheets

Be sure to give the document a name



	A	B	C	D
1	Site	Metric	Date	Temperature (°C)
2	Big Trout Creek	Max Water Temp	9/11/2016	12.58
3	Big Trout Creek	Min Water Temp	9/11/2016	6.58
4	Big Trout Creek	Max Air Temp	9/11/2016	22.2
5	Big Trout Creek	Min Air Temp	9/11/2016	3.61
6	Big Trout Creek	Max Water Temp	9/12/2016	10.63
7	Big Trout Creek	Min Water Temp	9/12/2016	7.01
8	Big Trout Creek	Max Air Temp	9/12/2016	12.55
9	Big Trout Creek	Min Air Temp	9/12/2016	4.71
10	Big Trout Creek	Max Water Temp	9/13/2016	9.31
11	Big Trout Creek	Min Water Temp	9/13/2016	4.53
12	Big Trout Creek	Max Air Temp	9/13/2016	12.55
13	Big Trout Creek	Min Air Temp	9/13/2016	-2.07
14	Big Trout Creek	Max Water Temp	9/14/2016	9.5
15	Big Trout Creek	Min Water Temp	9/14/2016	4.35
16	Big Trout Creek	Max Air Temp	9/14/2016	14.29
17	Big Trout Creek	Min Air Temp	9/14/2016	-1.38
18	Big Trout Creek	Max Water Temp	9/15/2016	9.43
19	Big Trout Creek	Min Water Temp	9/15/2016	3.56
20	Big Trout Creek	Max Air Temp	9/15/2016	16.32
21	Big Trout Creek	Min Air Temp	9/15/2016	-0.14
22	Big Trout Creek	Max Water Temp	9/16/2016	10.32

For this tutorial, you can **directly copy and paste data from ExampleTimeSeriesData.xlsx** into the new Sheets document. It is a lot of data, so it may take a few minutes to finish after you hit paste. (If the page becomes unresponsive, click Wait.)

Otherwise, add your own data to the Sheet.

To successfully link with Data Studio, **your data need to be organized in a specific way**. The next few slides will cover data organization.

Step 1: Organize data in Google Sheets

The data need to be organized in a specific way.

y-values: only one column of y-values can be plotted at a time in Data Studio.

For this application put all y-values in a single column. However, more advanced applications may use multiple columns of y-values.

metrics: to plot multiple curves on the graph at once, identify each row with the metric name.

In this example, there are four metrics for daily data:
Max Water Temp, Min Water Temp, Max Air Temp, and Min Air Temp

A	B	C	D
Site	Metric	Date	Temperature (°C)
Big Trout Creek	Max Water Temp	9/11/2016	12.58
Big Trout Creek	Min Water Temp	9/11/2016	6.58
Big Trout Creek	Max Air Temp	9/11/2016	22.2
Big Trout Creek	Min Air Temp	9/11/2016	3.61
Big Trout Creek	Max Water Temp	9/12/2016	10.63
Big Trout Creek	Min Water Temp	9/12/2016	7.01
Big Trout Creek	Max Air Temp	9/12/2016	12.55
Big Trout Creek	Min Air Temp	9/12/2016	4.71
Big Trout Creek	Max Water Temp	9/13/2016	9.31
Big Trout Creek	Min Water Temp	9/13/2016	4.53
Big Trout Creek	Max Air Temp	9/13/2016	12.55
Big Trout Creek	Min Air Temp	9/13/2016	-2.07
⋮	⋮	⋮	⋮
Payne Creek	Max Water Temp	8/24/2019	20.88
Payne Creek	Min Water Temp	8/24/2019	12.6
Payne Creek	Max Air Temp	8/24/2019	44.65
Payne Creek	Min Air Temp	8/24/2019	3.14
Payne Creek	Max Water Temp	8/25/2019	21.41
Payne Creek	Min Water Temp	8/25/2019	14.14
Payne Creek	Max Air Temp	8/25/2019	41.76
Payne Creek	Min Air Temp	8/25/2019	8.04

site names | metrics | x-values | y-values

Step 1: Organize data in Google Sheets

The data need to be organized in a specific way.

x-values: each x-value needs to appear once for each series being plotted

site names: include data for all sites together in the same column and indicate the site name in each row

Note: These columns can appear in any order. Additional columns can be added as needed with more information about the data.

A	B	C	D
Site	Metric	Date	Temperature (°C)
Big Trout Creek	Max Water Temp	9/11/2016	12.58
Big Trout Creek	Min Water Temp	9/11/2016	6.58
Big Trout Creek	Max Air Temp	9/11/2016	22.2
Big Trout Creek	Min Air Temp	9/11/2016	3.61
Big Trout Creek	Max Water Temp	9/12/2016	10.63
Big Trout Creek	Min Water Temp	9/12/2016	7.01
Big Trout Creek	Max Air Temp	9/12/2016	12.55
Big Trout Creek	Min Air Temp	9/12/2016	4.71
Big Trout Creek	Max Water Temp	9/13/2016	9.31
Big Trout Creek	Min Water Temp	9/13/2016	4.53
Big Trout Creek	Max Air Temp	9/13/2016	12.55
Big Trout Creek	Min Air Temp	9/13/2016	-2.07
⋮	⋮	⋮	⋮
Payne Creek	Max Water Temp	8/24/2019	20.88
Payne Creek	Min Water Temp	8/24/2019	12.6
Payne Creek	Max Air Temp	8/24/2019	44.65
Payne Creek	Min Air Temp	8/24/2019	3.14
Payne Creek	Max Water Temp	8/25/2019	21.41
Payne Creek	Min Water Temp	8/25/2019	14.14
Payne Creek	Max Air Temp	8/25/2019	41.76
Payne Creek	Min Air Temp	8/25/2019	8.04

site names | series | x-values | y-values

Step 1: Organize data in Google Sheets

The data need to be organized in a specific way.

Important notes:

- **Only the first row** can contain column headers.
- The y-value column header should be exactly as you want the **y-axis label** on the plot to appear.

  In the example to the right, the column header is Temperature (°C), including the units.

- After you link this sheet to Google Data Studio, any changes you make to the data (adding new data, changing or deleting existing data) will automatically be synced to the plot, however **changing the column headers will disrupt the link**.

A	B	C	D
Site	Metric	Date	Temperature (°C)
Big Trout Creek	Max Water Temp	9/11/2016	12.58
Big Trout Creek	Min Water Temp	9/11/2016	6.58
Big Trout Creek	Max Air Temp	9/11/2016	22.2
Big Trout Creek	Min Air Temp	9/11/2016	3.61
Big Trout Creek	Max Water Temp	9/12/2016	10.63
Big Trout Creek	Min Water Temp	9/12/2016	7.01
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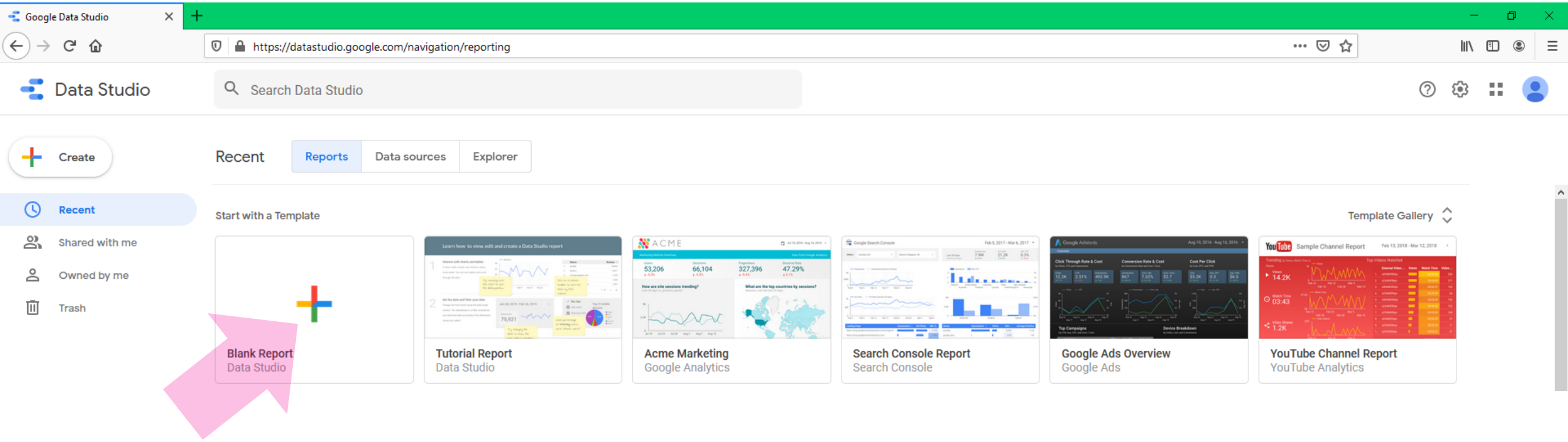
Big Trout Creek	Min Water Temp	9/13/2016	4.53
Big Trout Creek	Max Air Temp	9/13/2016	12.55
Big Trout Creek	Min Air Temp	9/13/2016	-2.07
⋮	⋮	⋮	⋮
Payne Creek	Max Water Temp	8/24/2019	20.88
Payne Creek	Min Water Temp	8/24/2019	12.6
Payne Creek	Max Air Temp	8/24/2019	44.65
Payne Creek	Min Air Temp	8/24/2019	3.14
Payne Creek	Max Water Temp	8/25/2019	21.41
Payne Creek	Min Water Temp	8/25/2019	14.14
Payne Creek	Max Air Temp	8/25/2019	41.76
Payne Creek	Min Air Temp	8/25/2019	8.04

site names | series | x-values | y-values

Step 2: Create a data report and link the data

Go to datastudio.google.com and create a new data report.

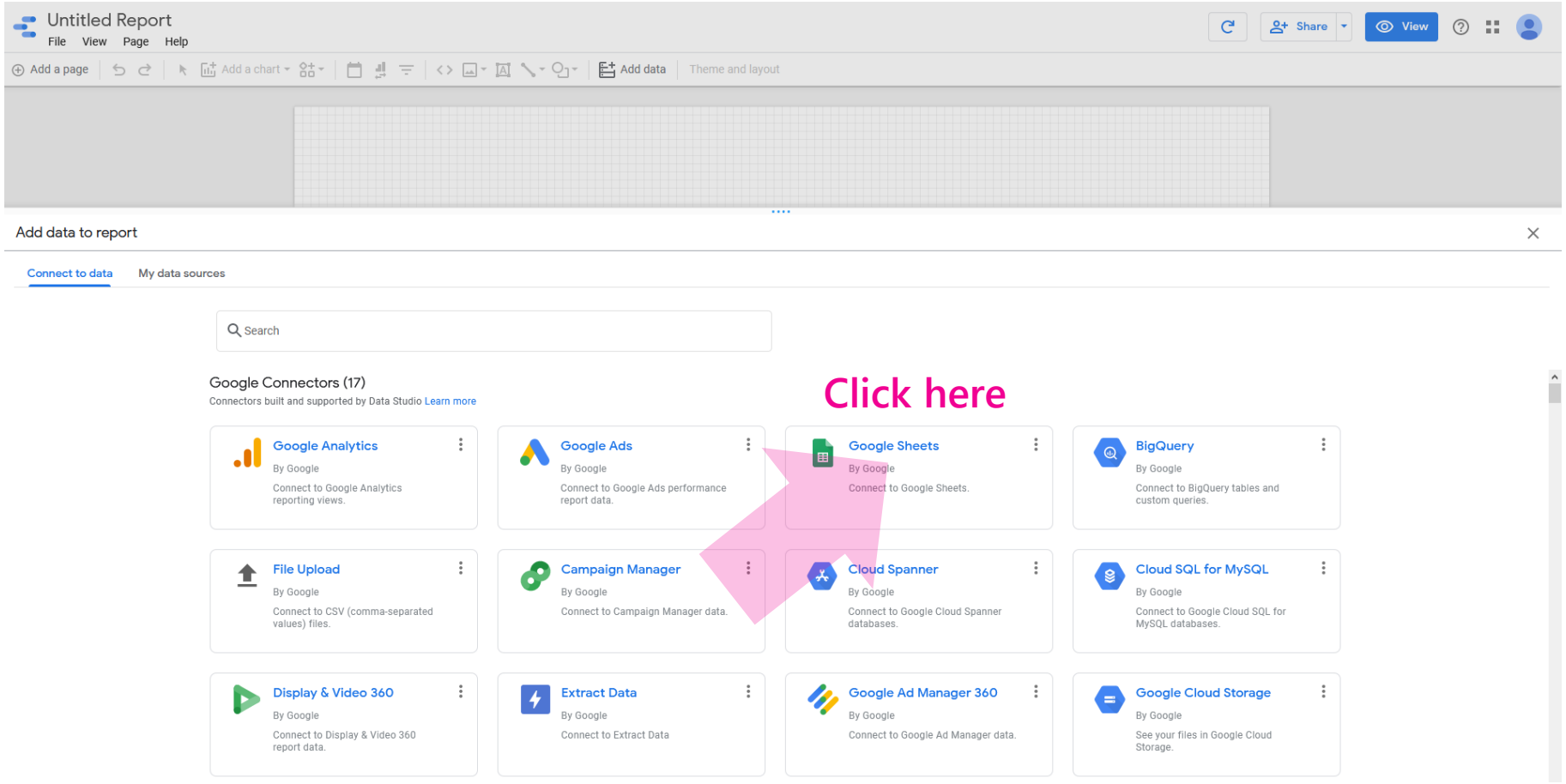


Click here

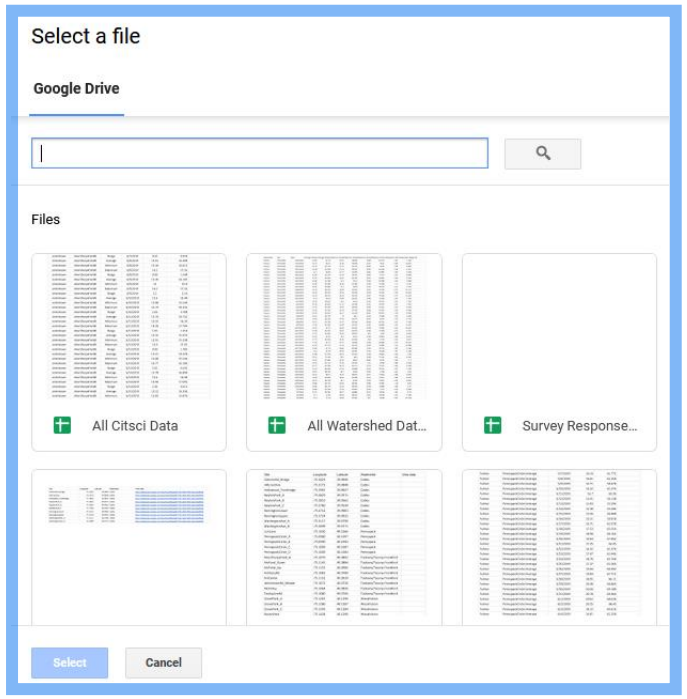
You may need to agree to Google Data Studio's terms of service.

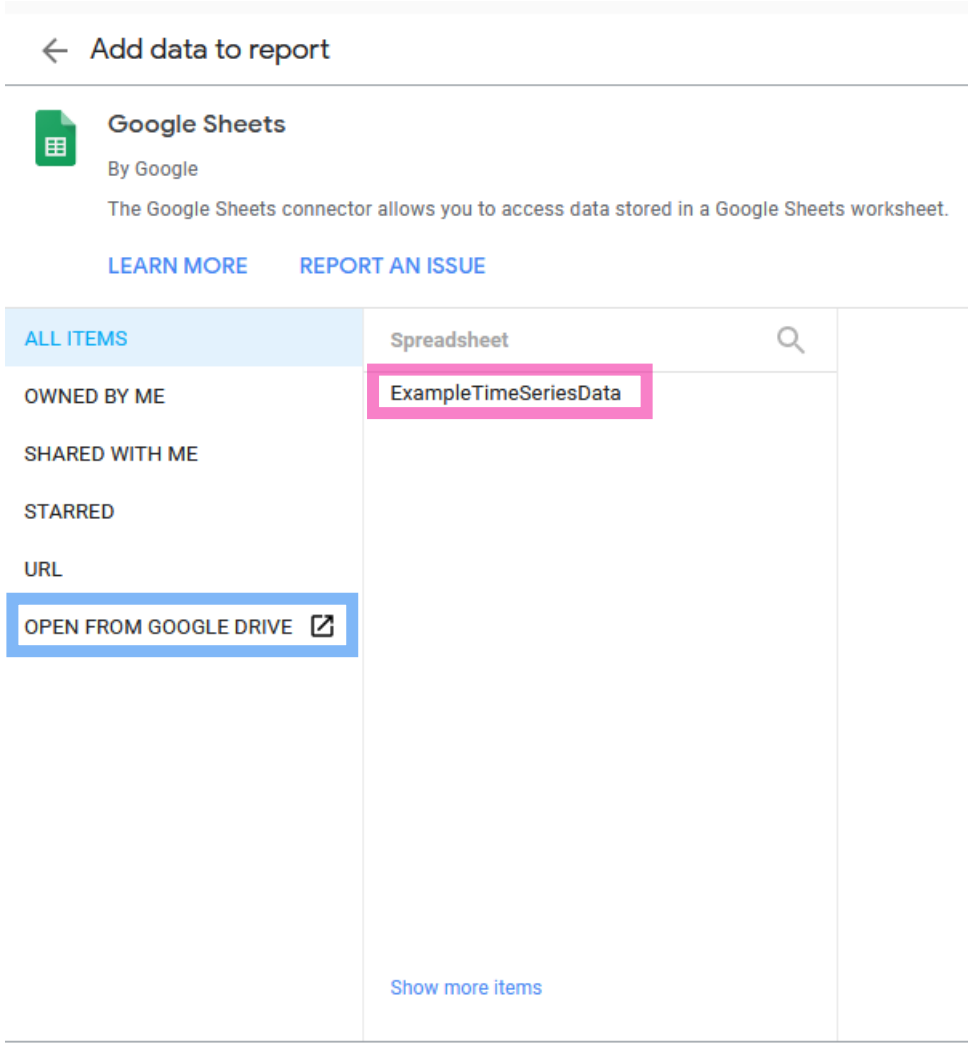
Step 2: Create a data report and link the data

A data source is required. Select Google Sheets.



Step 2: Create a data report and link the data

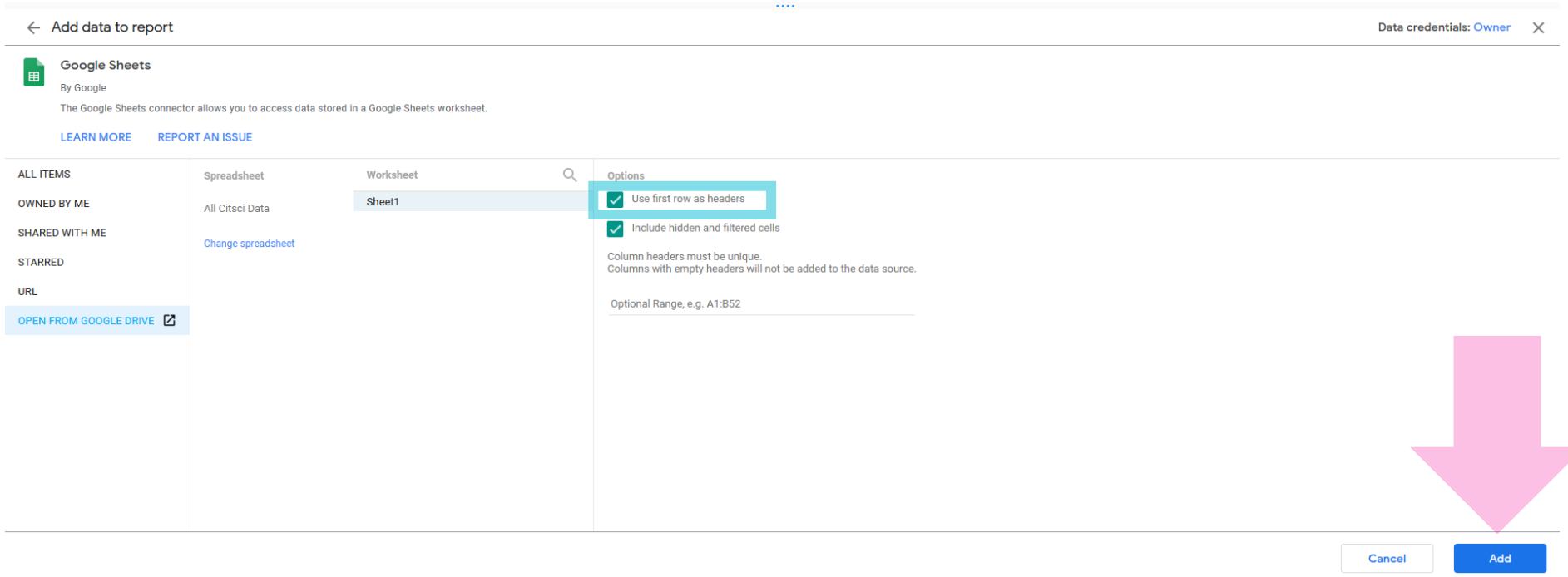




If the name of your Sheets document appears in the **list of recent Sheets**, select it. Otherwise, click **Open from Google Drive** and type the name into the search bar.

Step 2: Create a data report and link the data

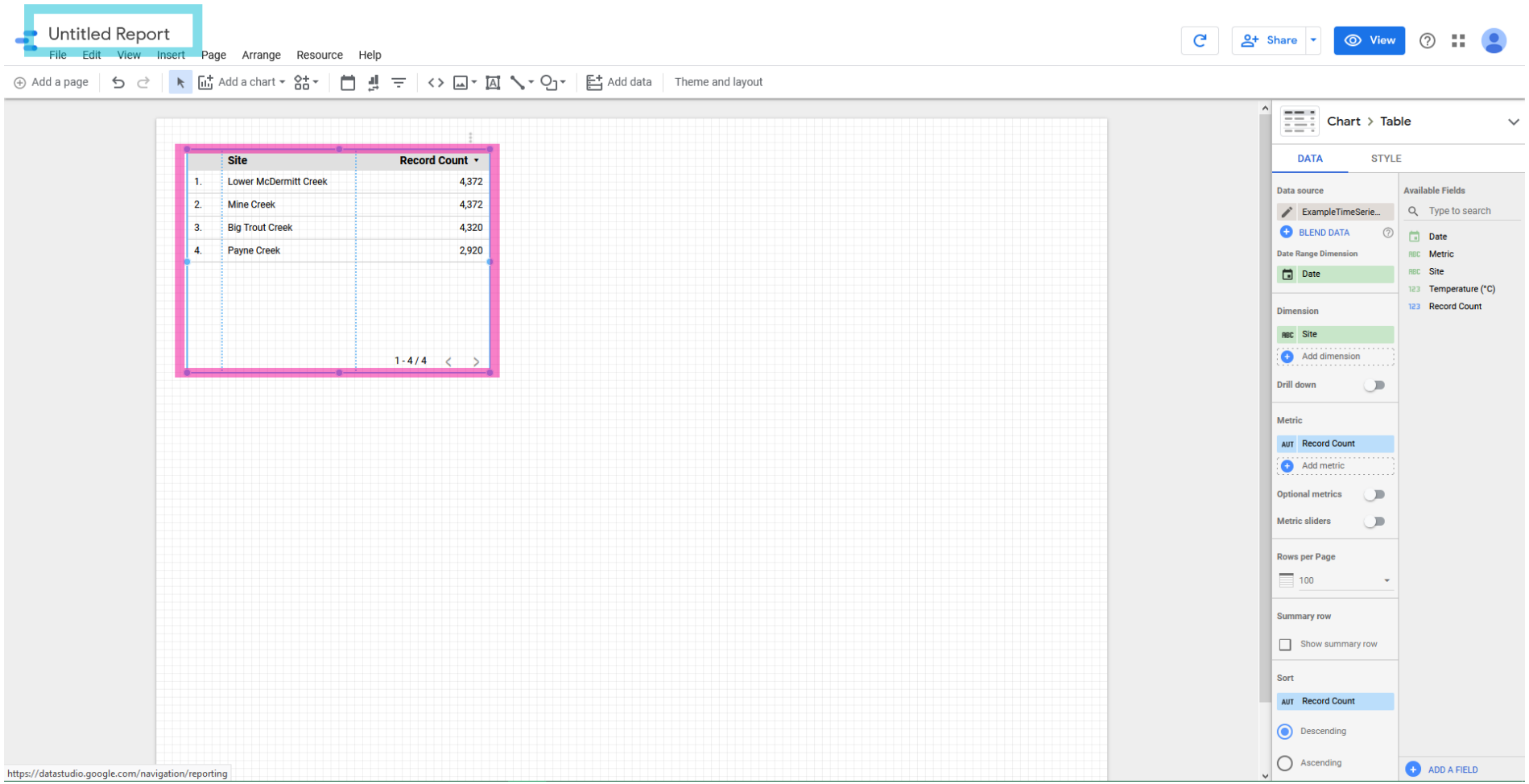
Ensure the box "**Use first row as headers**" is checked. Then click **Add**.



Step 2: Create a data report and link the data

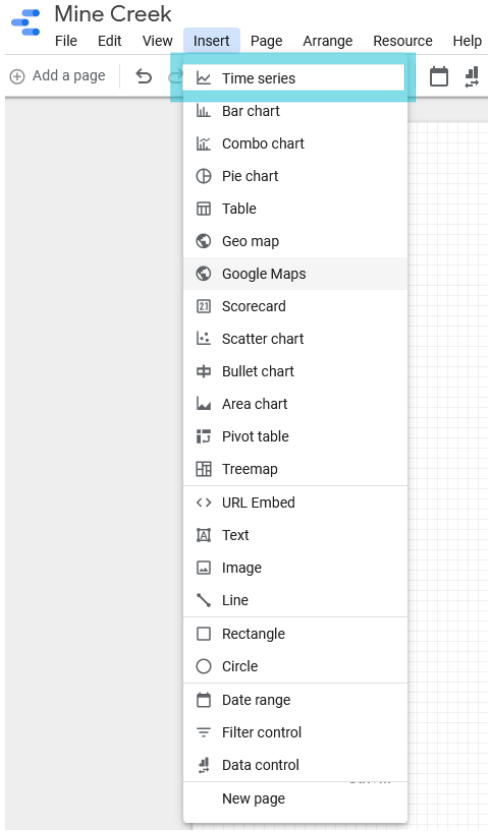
Name the report with your first field site name by typing where Untitled Report appears.

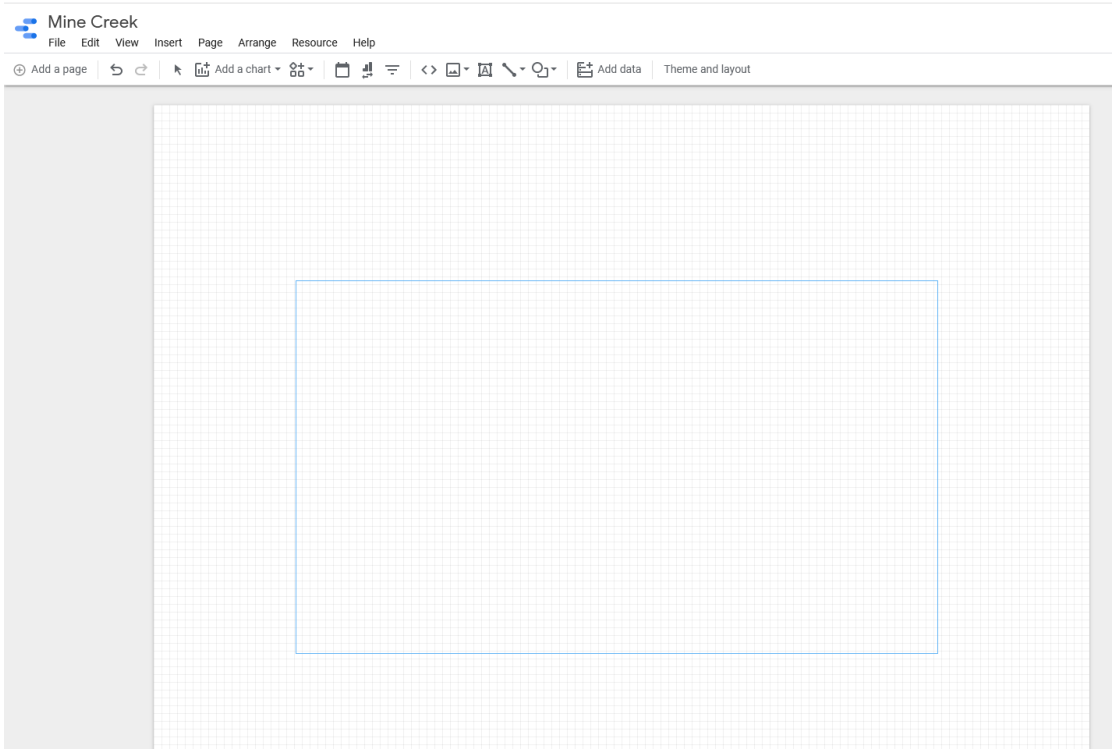
Delete the default table that appears by clicking on it and hitting delete or backspace on your keyboard. This will clear space for more interesting plots/data!



Step 3: Insert a time series chart

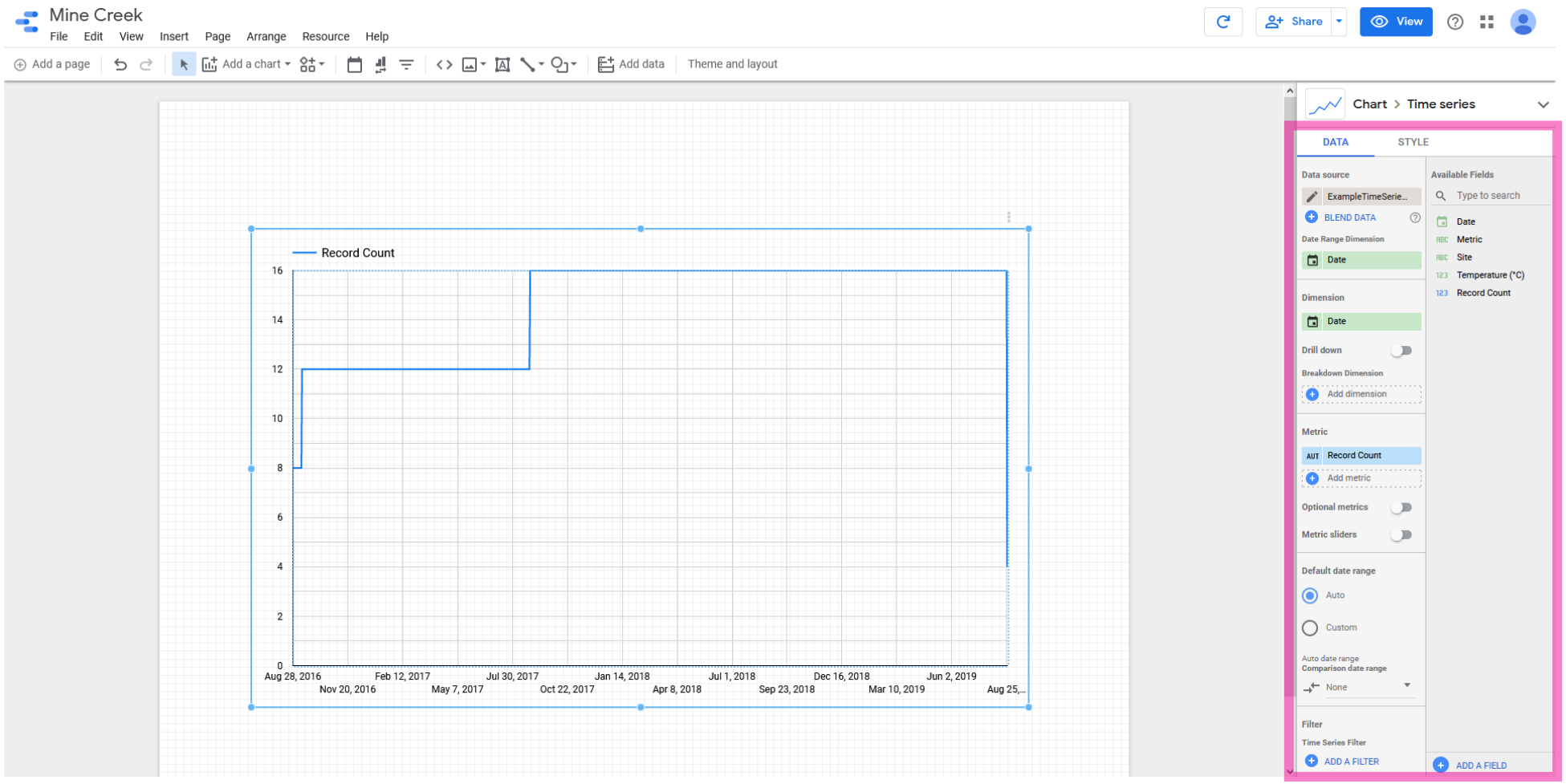
Click insert from the menu at the top of the screen, then **Time series**.





Draw a rectangle to define the shape/location of the chart (you can change this later).

Step 3: Insert a time series chart

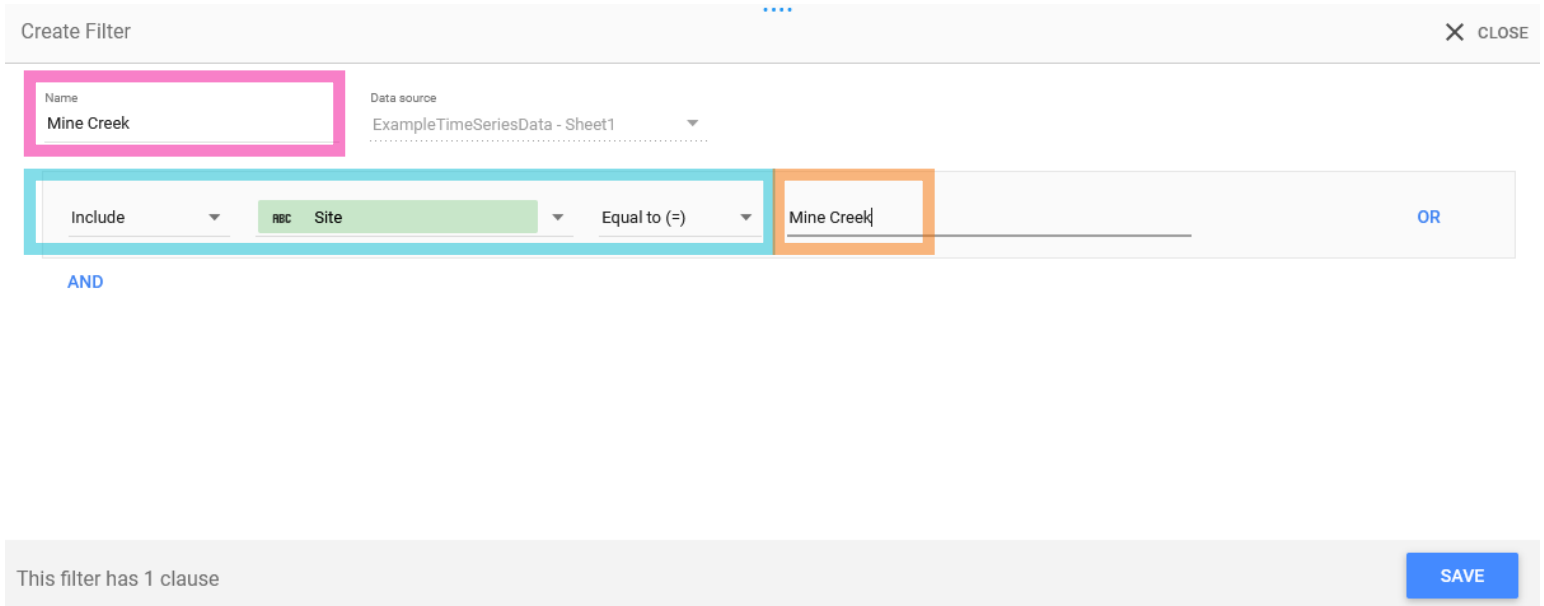


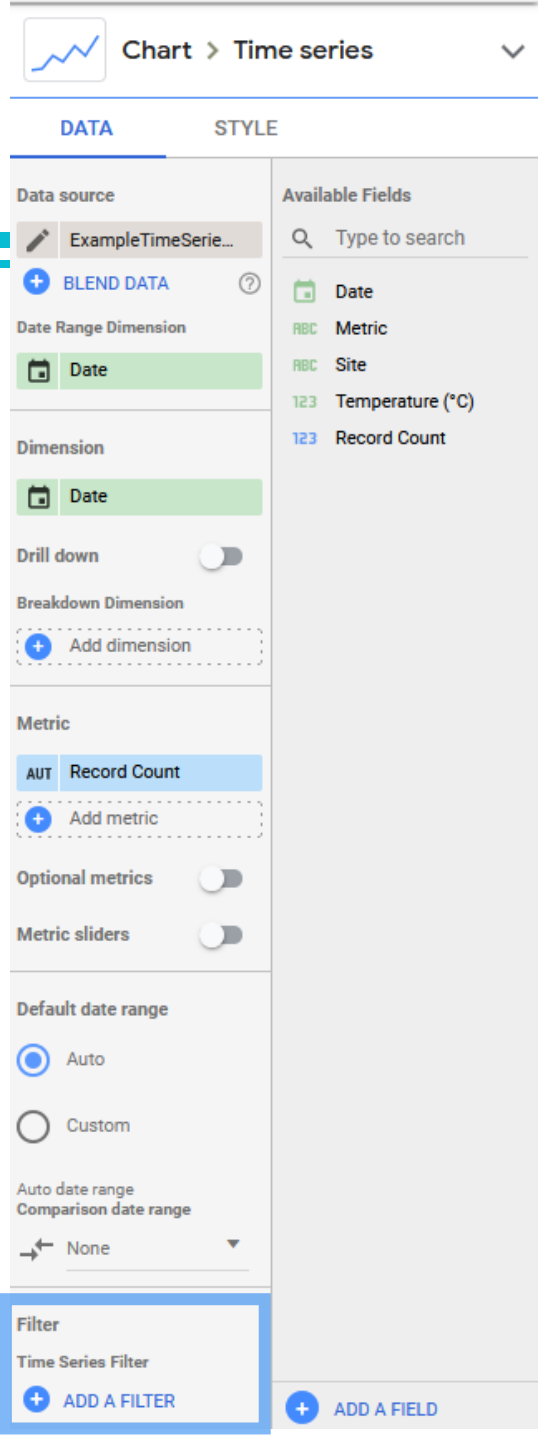
Whenever you click on the chart to select it, **a menu** will appear on the right side of the screen with two tabs at the top, DATA and STYLE.

Step 3: Insert a time series chart

In the DATA tab, find the **Filter** section near the bottom. You may need to use the scroll wheel on your mouse (or two fingers on your trackpad) to reach it.

Click ADD A FILTER. In the Create Filter window, **type the name** of your first field site. A series of drop-down menus will appear: select **Include**, then your **site name column header**, then **Equal to (=)**. Finally, **type the name** of the field site again and **click save**. This creates a filter that selects only data from that field site.





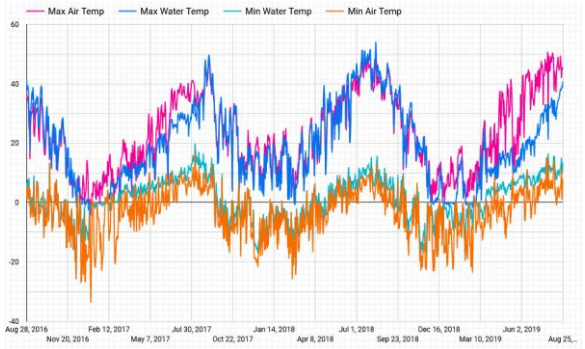
Step 3: Insert a time series chart

Click on the chart to select it. On the right-hand menu, scroll back to the top of the DATA tab and:

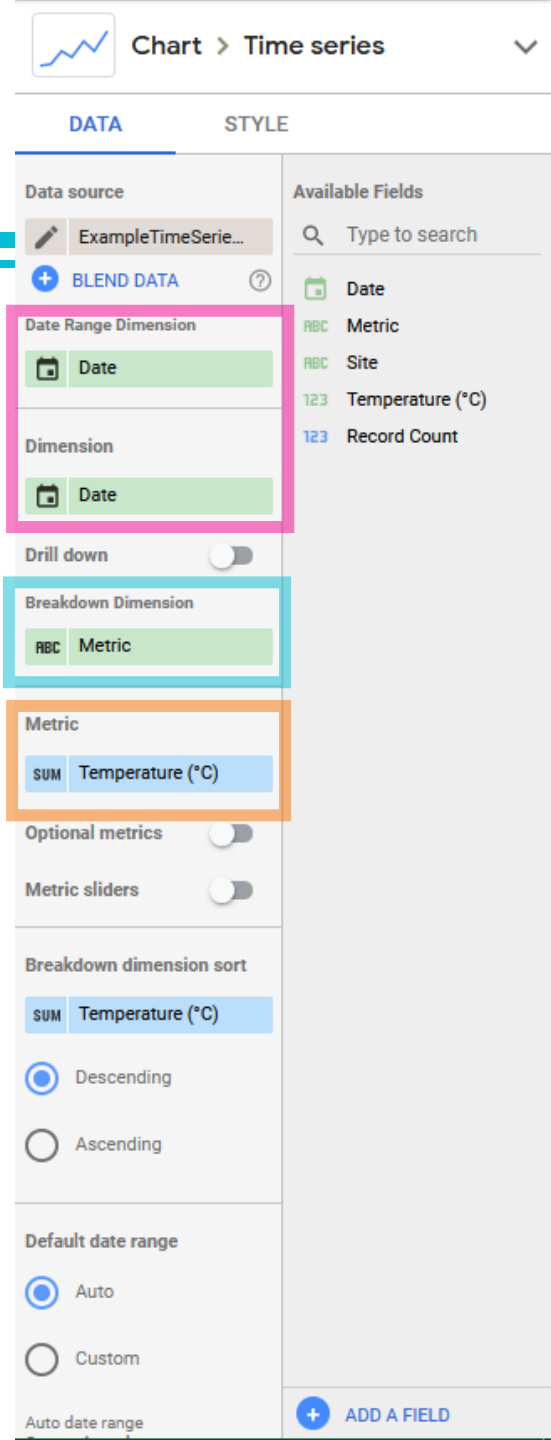
Ensure the **date (x-value) column header** is selected for Date Range Dimension and Dimension.

Select the **metric column header** for Breakdown Dimension.
(this setting divides the data into multiple curves to plot)

Select the **y-value column header** for Metric.
(this setting is the value plotted for each Breakdown Dimension)



The chart should be looking much better now!



Step 4: Spruce up the chart!

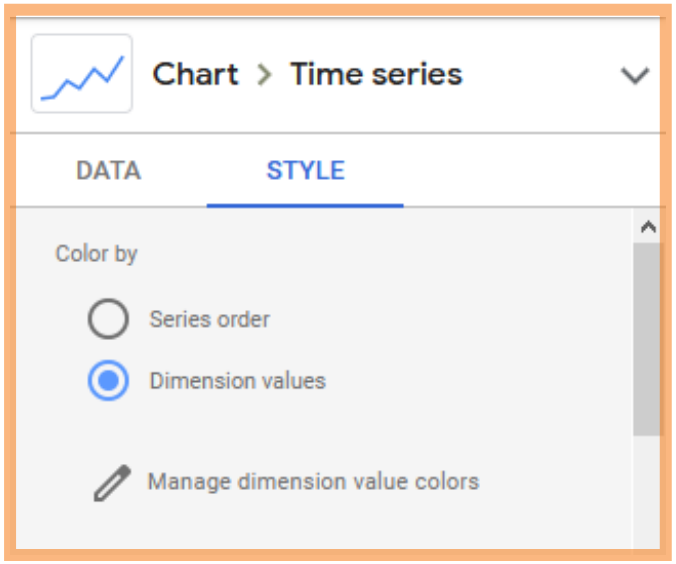
In the STYLE tab, use the scroll arrow on the right to find different tools. Some examples to get you started:

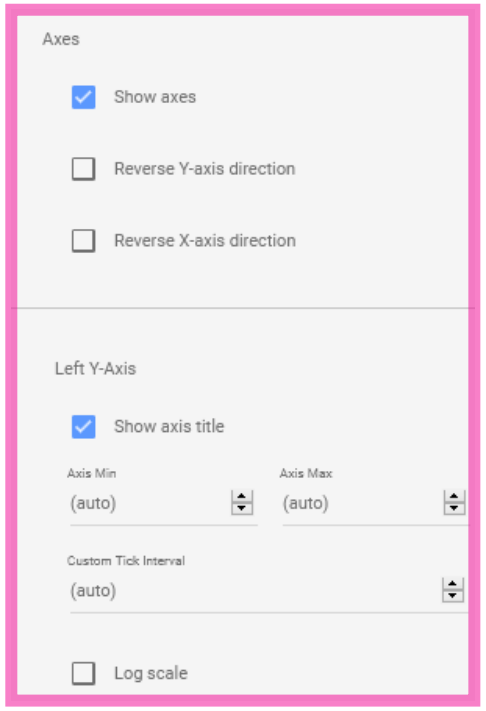
Change series colors by clicking on Manage dimension value colors. One color should appear for each metric. Click on each color to change it.

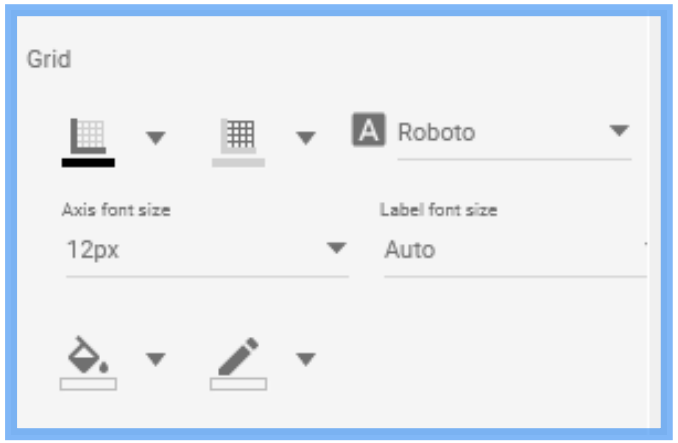
Select how data gaps are displayed under General

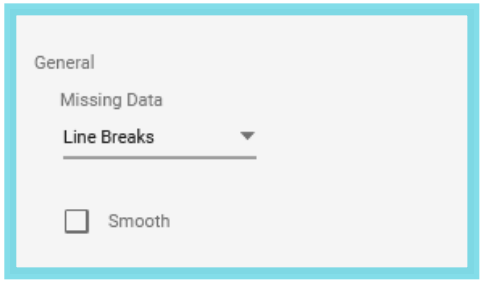
Format axes under Axes, including ticks, axis titles, and min/max.

Change axis font size under Grid. The axis font size setting controls the size of x and y axis titles and labels.









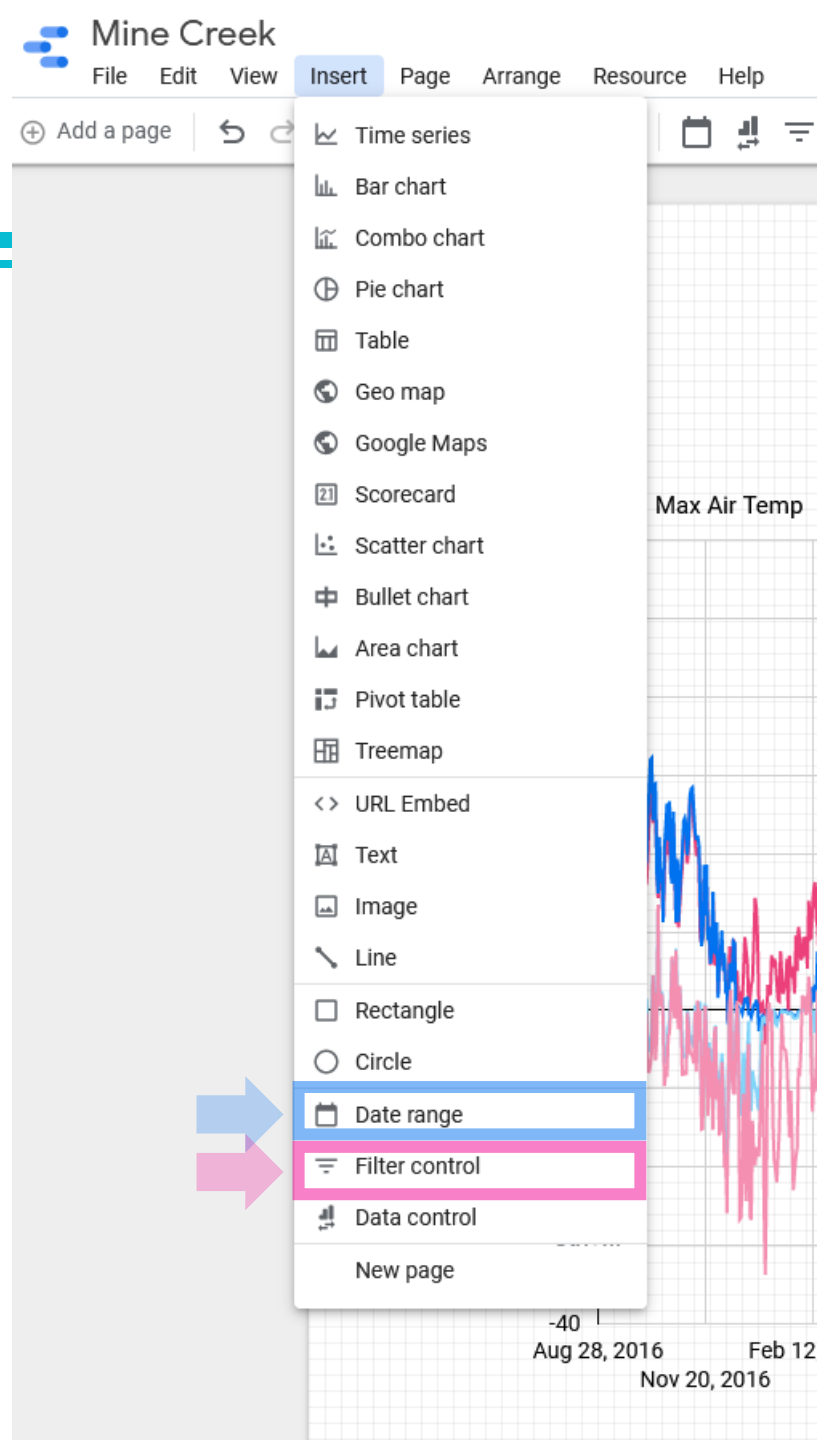
Step 4: Spruce up the chart!

Add interactive chart options

1. **Dynamic date range**:
   Insert -> Date range
   Draw a box (or click a location) for the button to be located.

2. **Dynamic metric control**:
   Insert -> Filter control
   Draw a box (or click a location) for the button to be located

Click View in the upper right corner to toggle into viewer mode and test out the dynamic controls. When you're done, click Edit to toggle back into editor mode.



Step 4: Spruce up the chart!

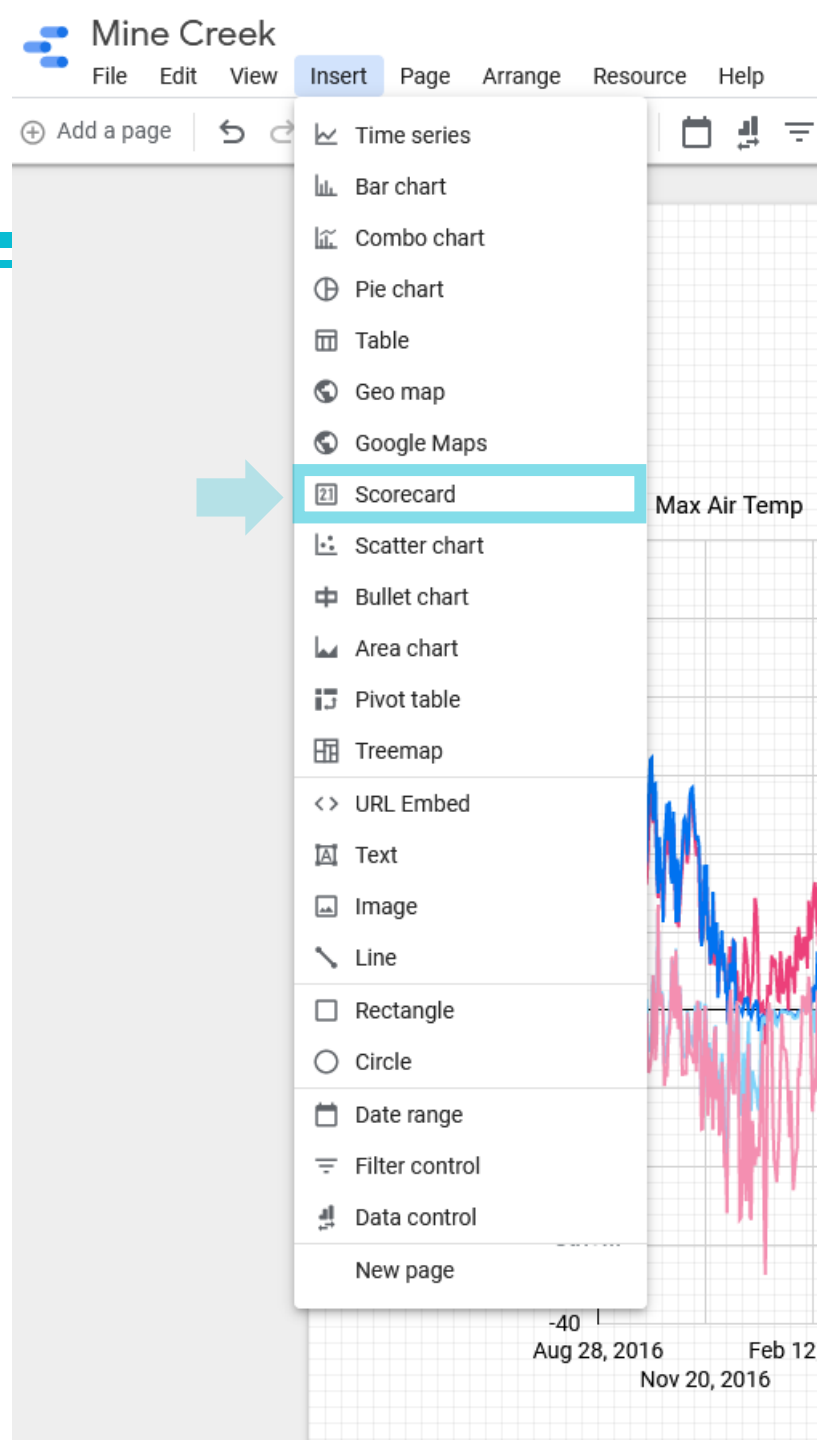
Add interactive statistics (scorecards)

Insert -> **Scorecard**
Draw a box (or click a location) for the scorecard.

This will calculate and display a value based on the data in the chart.

The following slides will walk through two examples:

1. **Maximum water temperature displayed**.
2. **Average maximum air temperature displayed**.



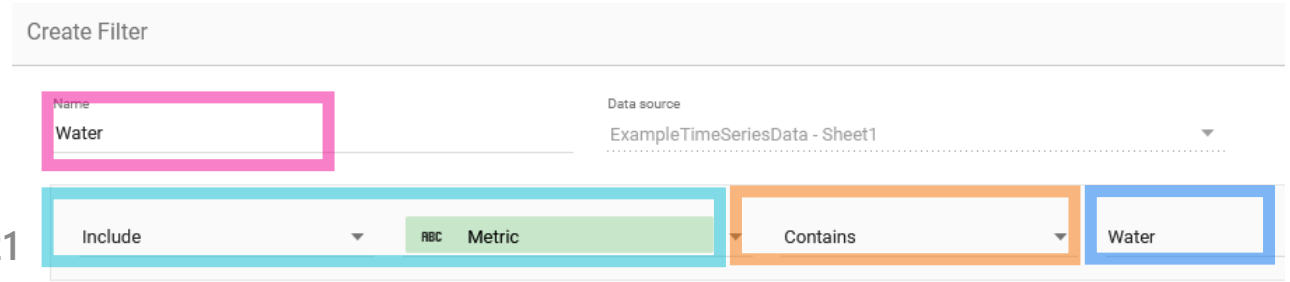
Step 4: Spruce up the chart!

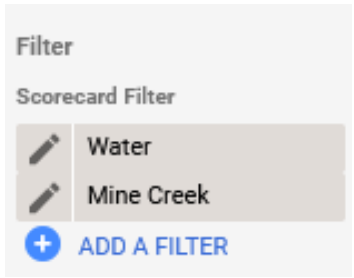
Example 1. **Maximum water temperature displayed**.

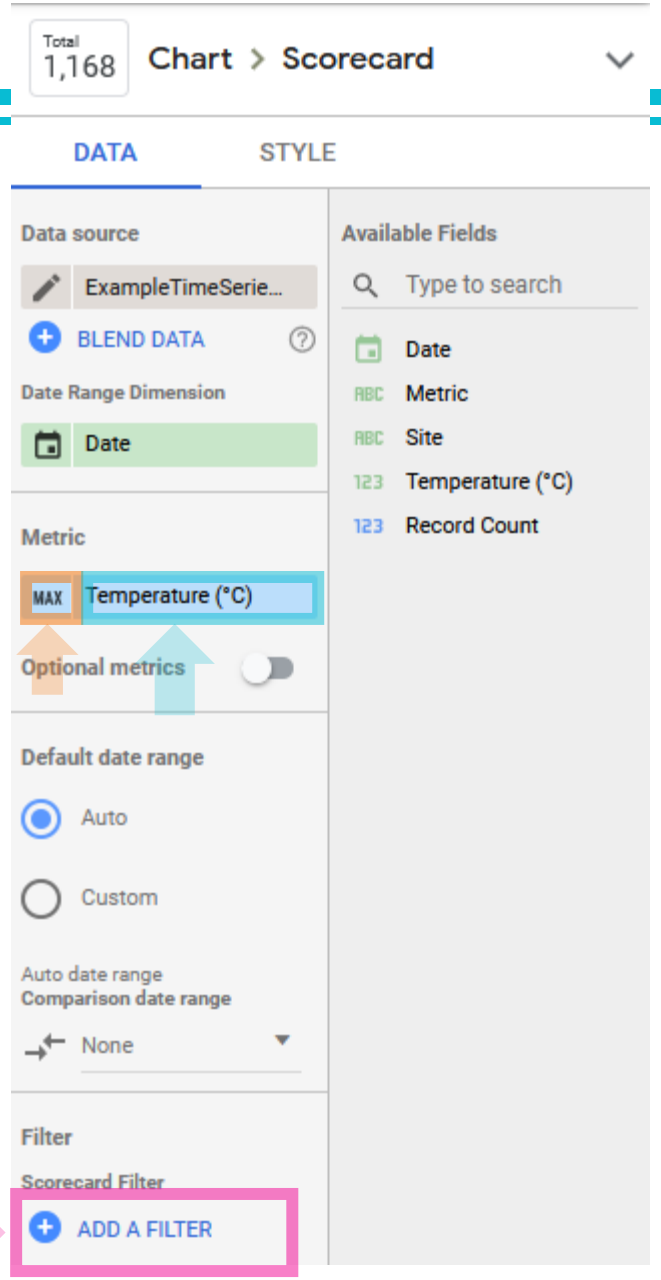
Under metric, select **Temperature (°C)**. Then click on the small square next to that and **select Max**. These selections mean that it will calculate the maximum temperature value displayed.

Use a filter to only consider water temperatures. Click ADD A FILTER and create a filter called **Water**, only **including** data for which the **metric** field **contains** the term **Water**.

Don't forget to add the Mine Creek (site name) filter as well.







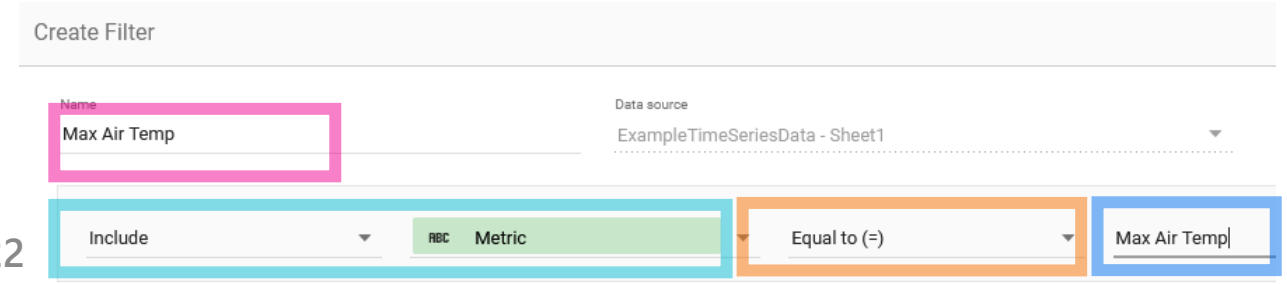
Step 4: Spruce up the chart!

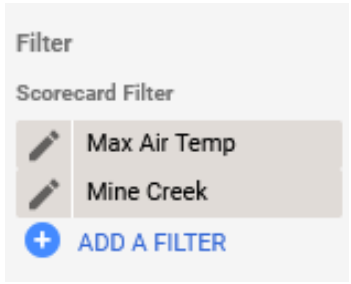
Example 2. **Average maximum air temperature displayed**.

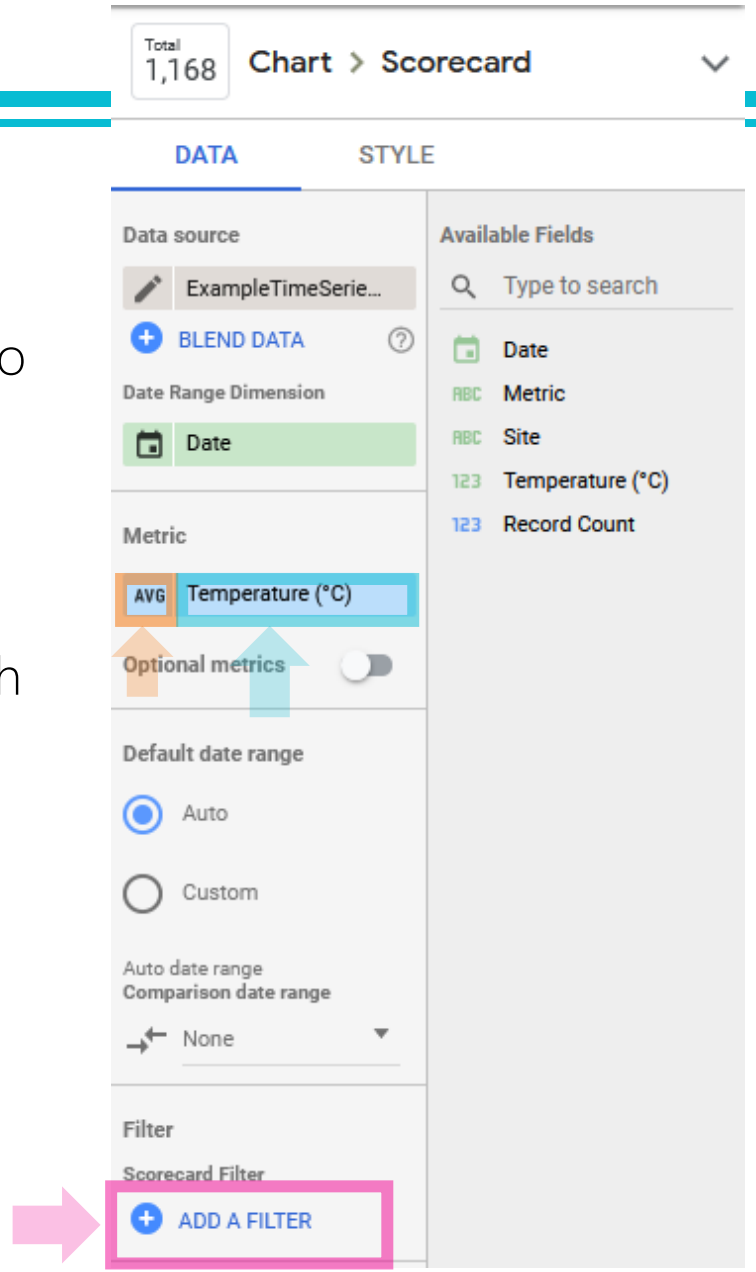
Under metric, select **Temperature (°C)**. Then click on the small square next to that and **select Avg**. These selections mean that it will calculate the average temperature value displayed.

Use a filter to only consider daily maximum air temperatures. Click ADD A FILTER and create a filter called **Max Air Temp**, only **including** data for which the **metric** field **equals Max Air Temp**.

Don't forget to add the Mine Creek (site name) filter as well.







Step 4: Spruce up the chart!

Formatting interactive statistics (scorecards)

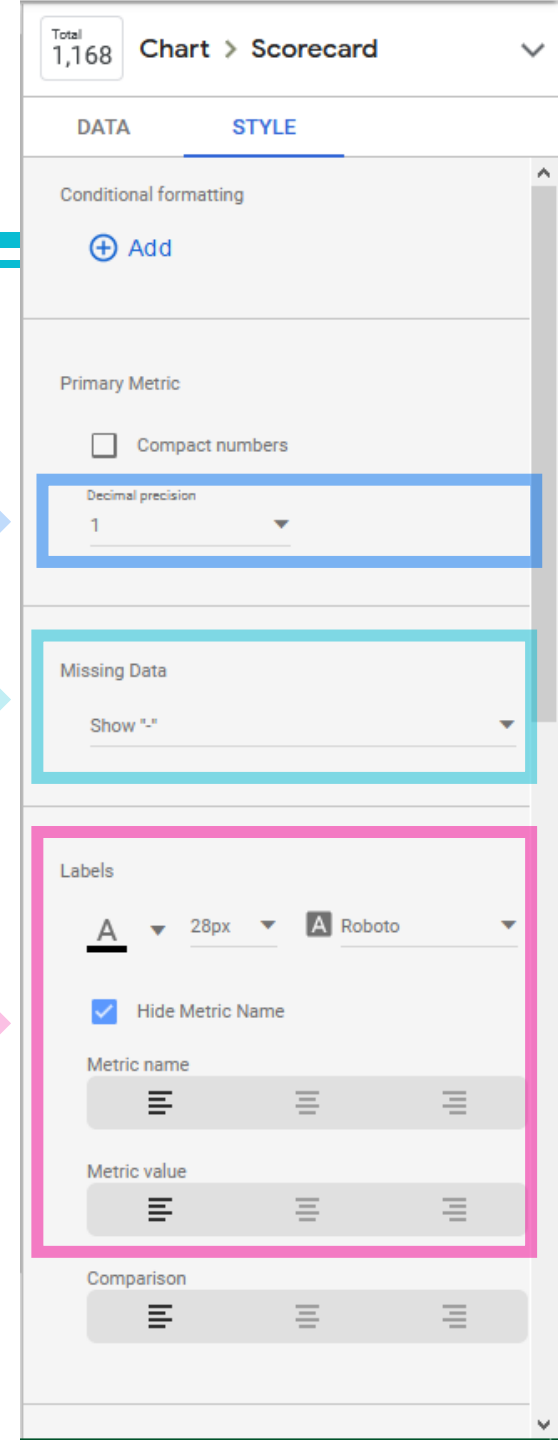
Click on the statistic to select it. In the STYLE tab:

Under Primary Metric, **set the decimal precision**.

Under Missing Data, **select what to display** when there is no number to show.

Under Labels, **format the font and alignment**.

Check the box “Hide Metric Name” to add your own label & units using Insert text. (*see next slide*)



Step 4: Spruce up the chart!

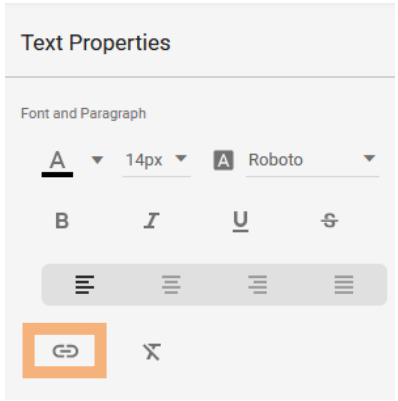
Add text, images, and/or other design elements to the page

In the Insert menu, you can choose:

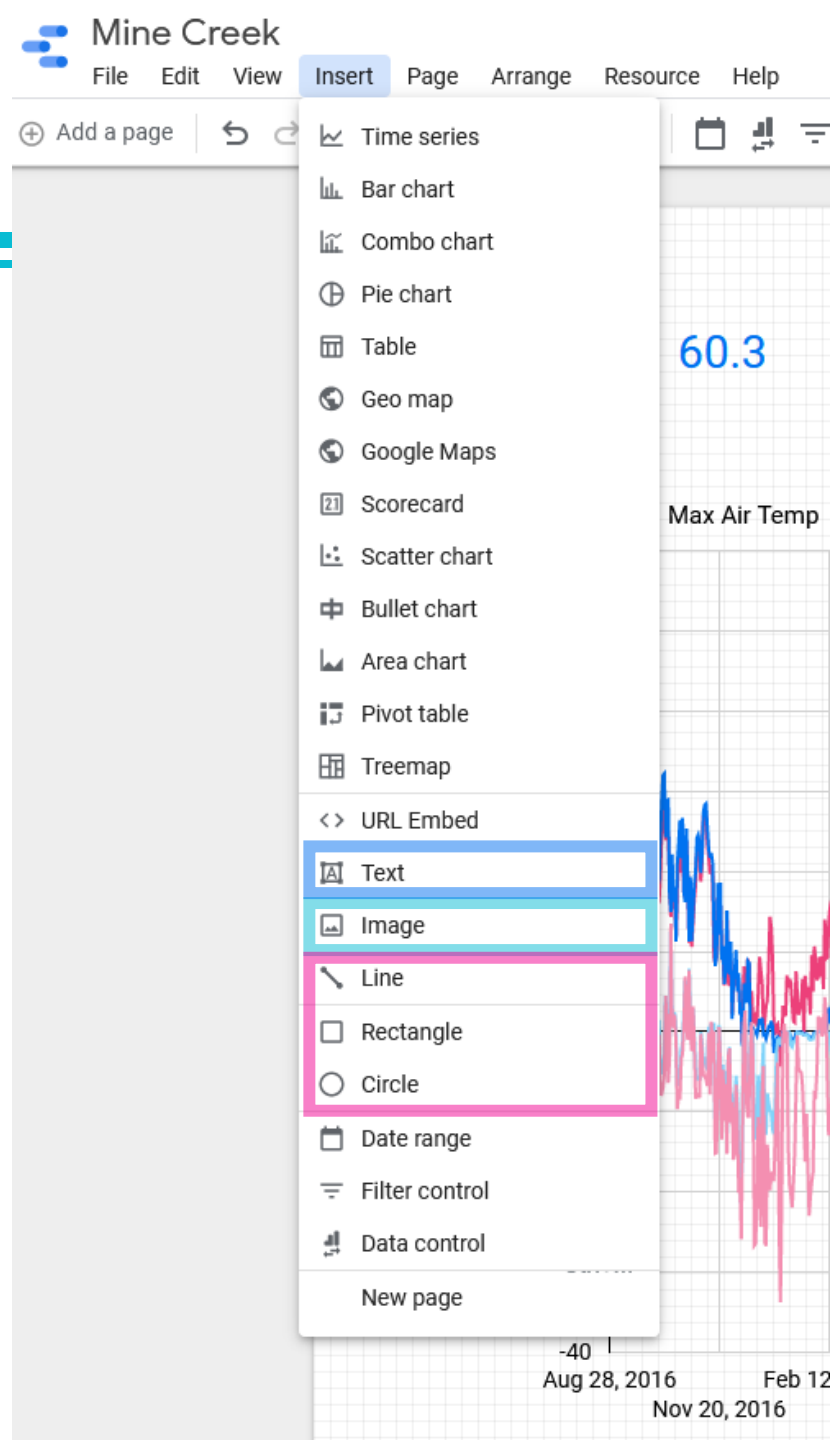
Text: Add text, such as a chart title, text to explain the dynamic statistics, or links to other pages

Image: Add a photo of the field site

Line, Rectangle, Circle: Add a box or line to delineate certain text/elements from others



Insert a link into text



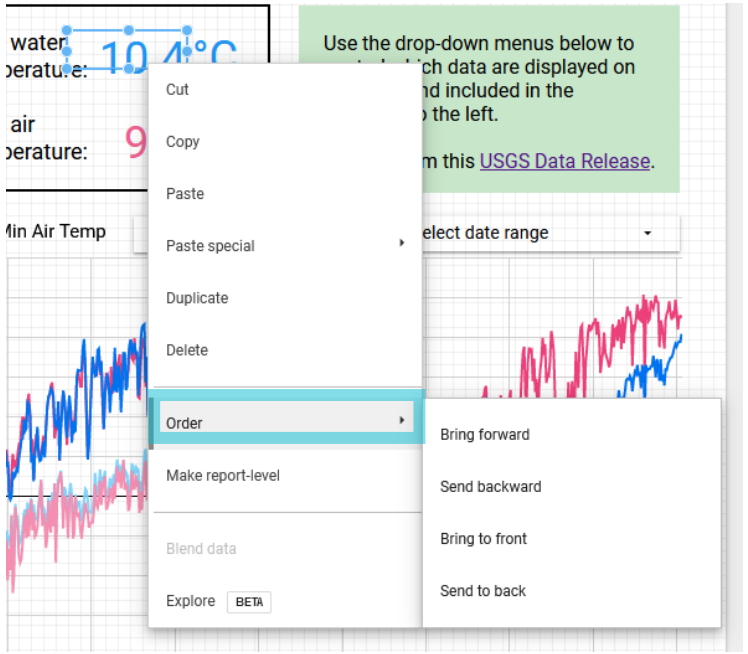
Step 4: Spruce up the chart!

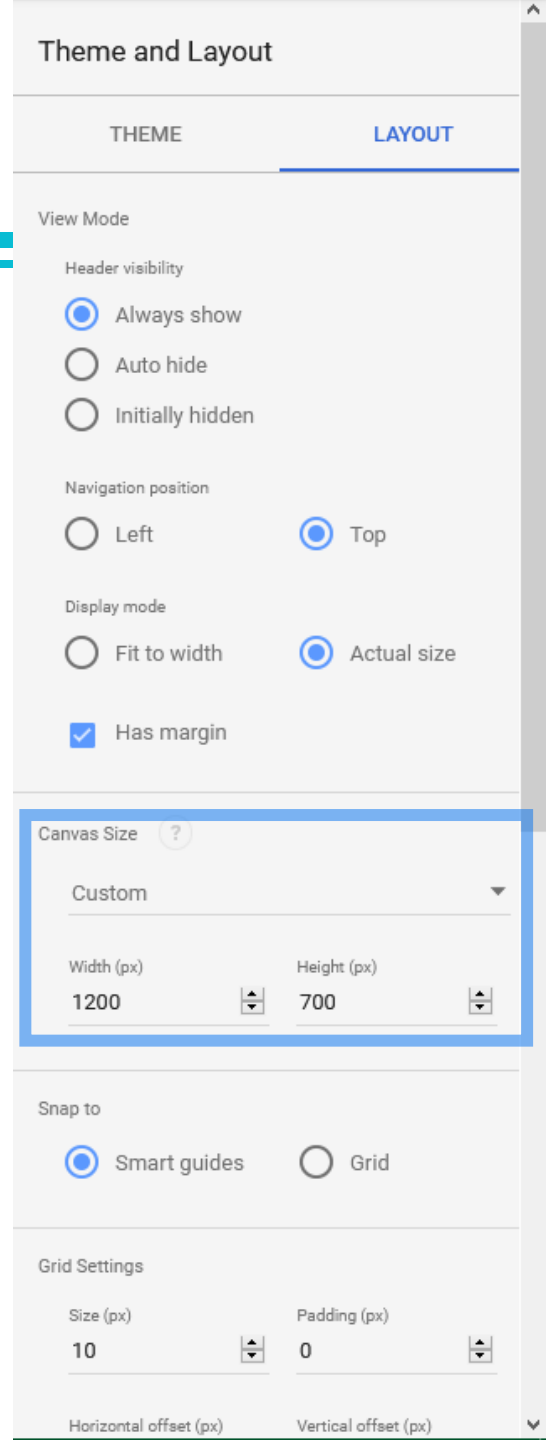
Miscellaneous notes about designing a Data Studio page:

1. **Control the size of the page** under the LAYOUT tab (visible on the right of the screen when nothing is selected).

2. Right-click on any item and use the **Order tool** to help you edit features.
   For example, if a box is in front of text you will not be able to edit the text.

3. Within a text box, the mouse cannot be used to move the cursor to a specific spot. Instead, use the arrow keys on the keyboard.



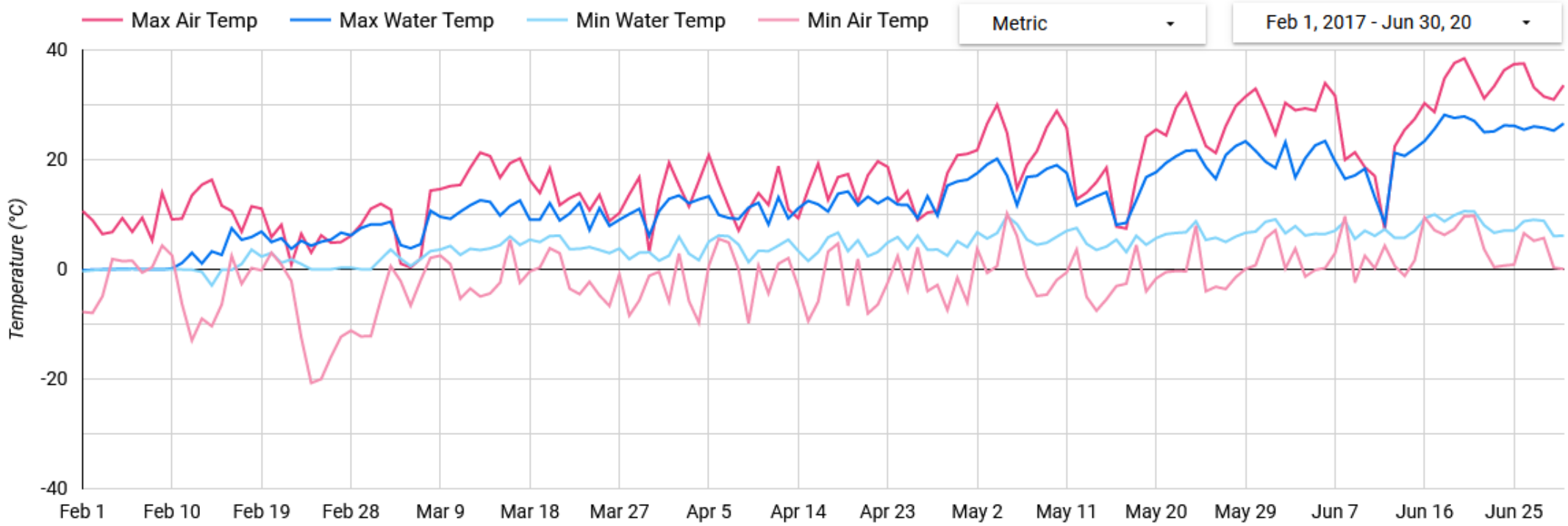


Stream and air temperature from Mine Creek, Oregon

Max. water temperature:	28.2°C	Max. air temperature:	38.5°C	Avg. water temperature:	8.6°C
Min. water temperature:	-2.9°C	Min. air temperature:	-20.7°C	Avg. air temperature:	8.2°C

Use the drop-down menus below to control which data are displayed on the chart and included in the statistics to the left.

All data from this USGS Data Release.

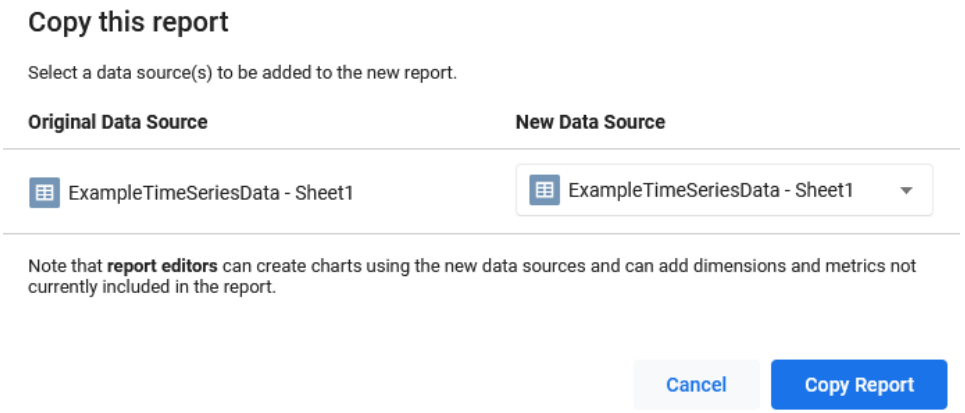


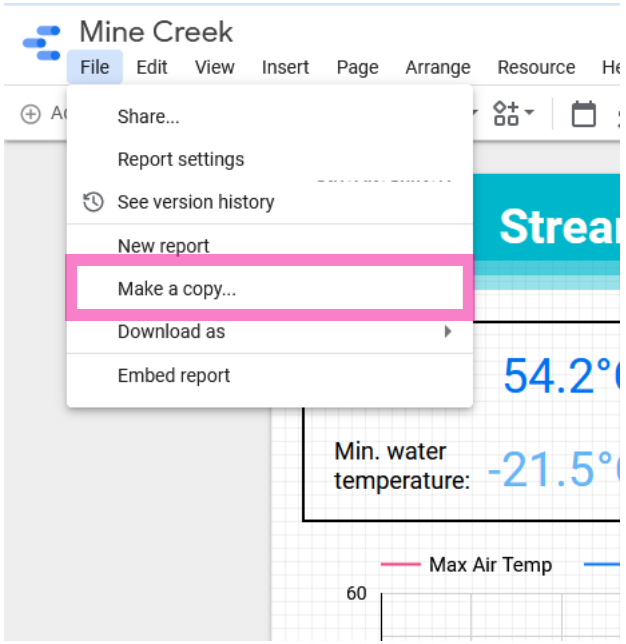
Step 5: Copy the Data Studio report for each site

If you want to use the same formatting and design for multiple sites, you can make a copy of this Data Studio report.

Click File -> **Make a copy**...

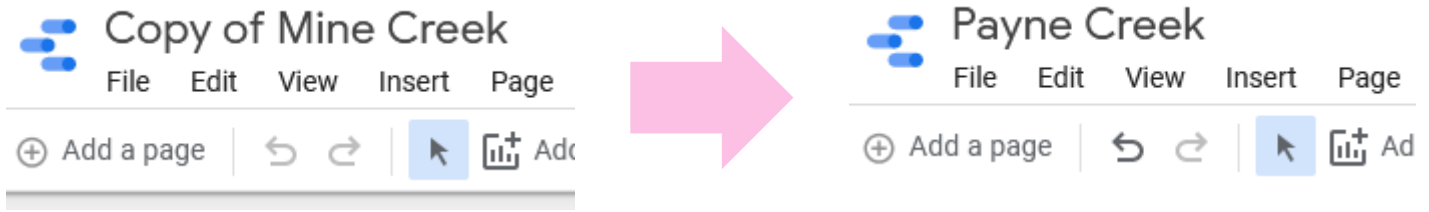
Choose a data source for the copied report.
(It will likely be the same source as the old report.)



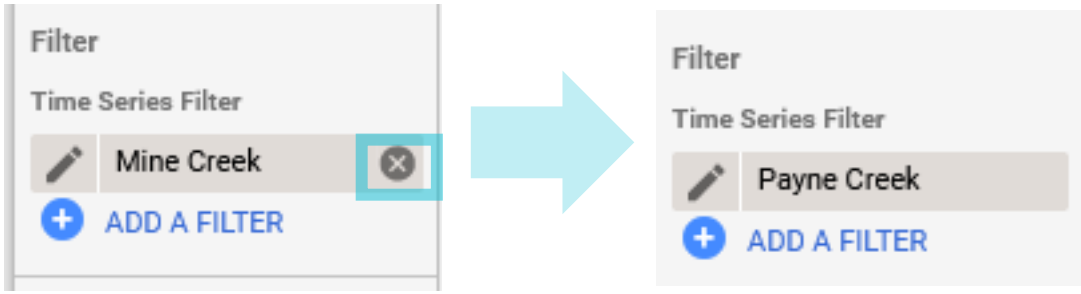


Step 5: Copy the Data Studio report for each site

1. **Rename** the Data Studio report.



2. Select the chart and delete the filter for the old field site by **clicking on the x**. Add a new filter with the new site name.



3. For all dynamic statistics and other chart elements, **change the filter** from the old site to the new site as necessary.

4. Update any text / images / links that need to be relevant to the new site.

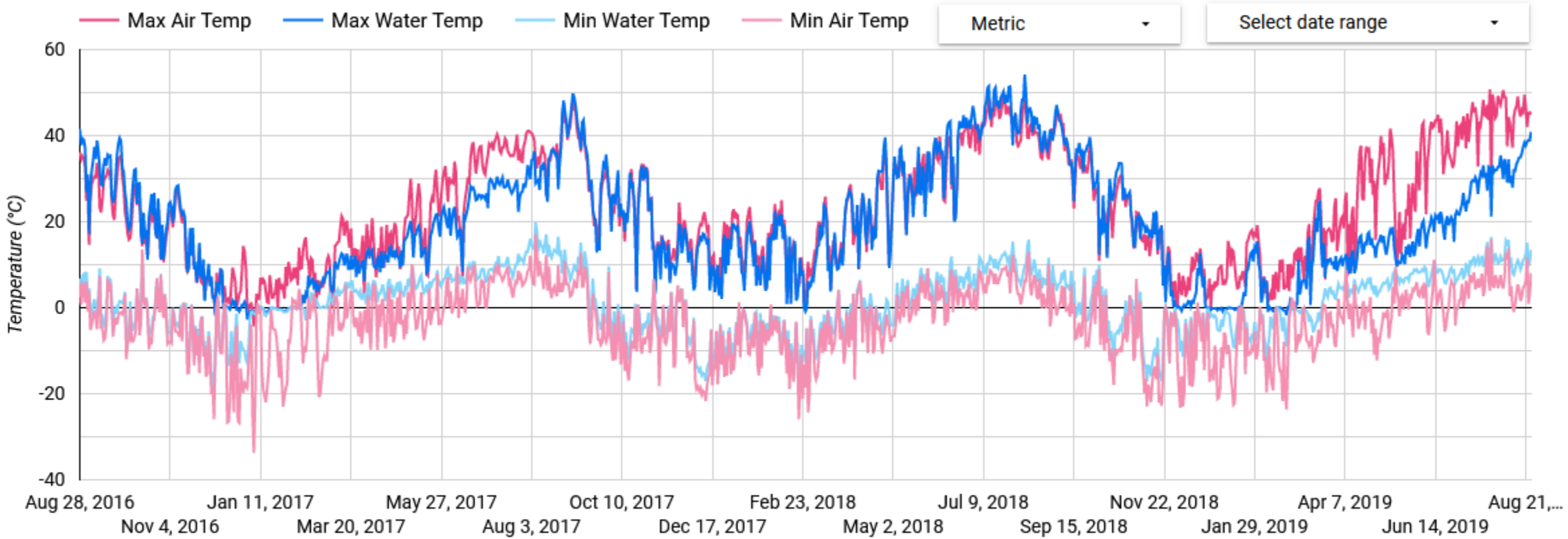
5. Repeat for all field sites.

Stream and air temperature from Mine Creek, Oregon

Max. water temperature:	54.2°C	Max. air temperature:	50.8°C	Avg. water temperature:	10.4°C
Min. water temperature:	-21.5°C	Min. air temperature:	-33.8°C	Avg. air temperature:	9.9°C

Use the drop-down menus below to control which data are displayed on the chart and included in the statistics to the left.

All data from this USGS Data Release.

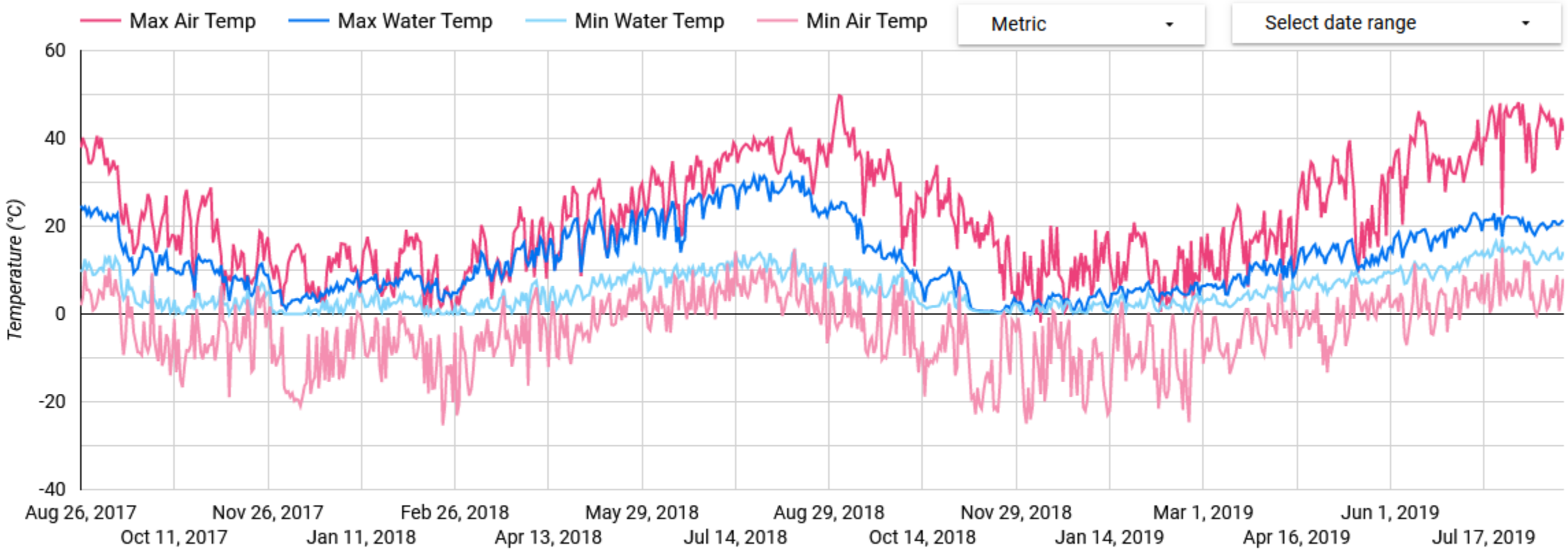


Stream and air temperature from Payne Creek, Oregon

Max. water temperature:	32.0°C	Max. air temperature:	49.8°C	Avg. water temperature:	9.2°C
Min. water temperature:	-0.0°C	Min. air temperature:	-25.4°C	Avg. air temperature:	9.3°C

Use the drop-down menus below to control which data are displayed on the chart and included in the statistics to the left.

All data from this USGS Data Release.

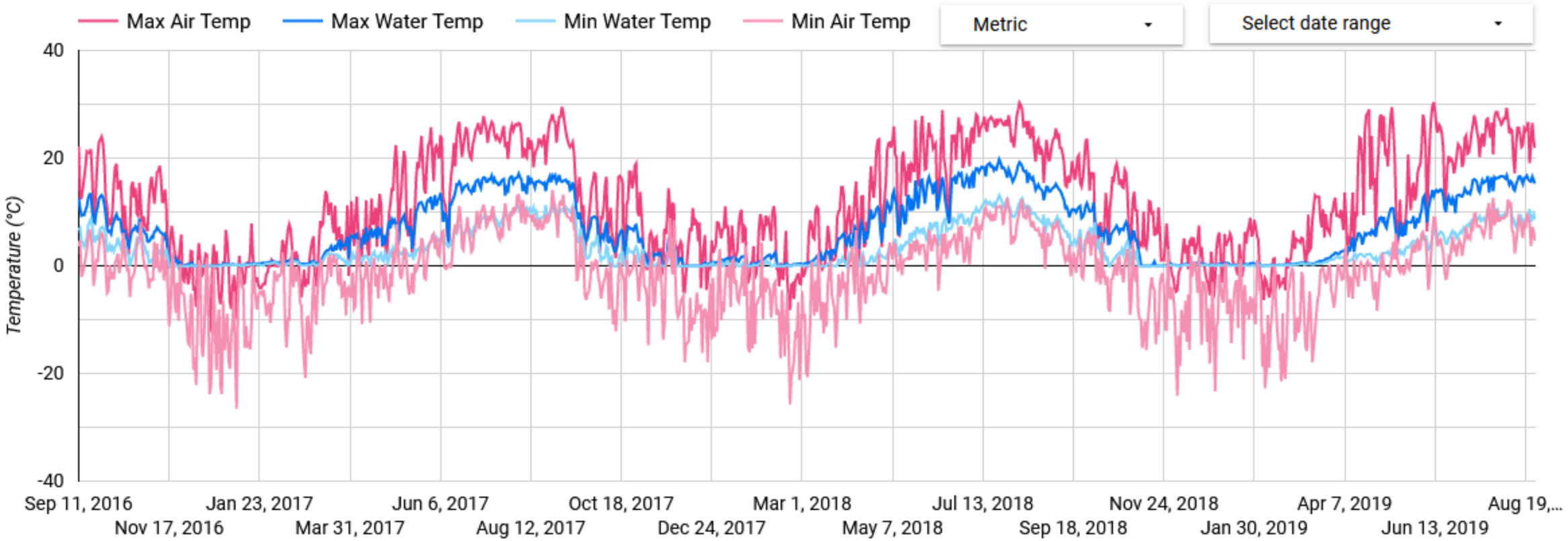


Stream and air temperature from Big Trout Creek, Oregon

Max. water temperature:	19.8°C	Max. air temperature:	30.4°C	Avg. water temperature:	5.1°C
Min. water temperature:	-0.1°C	Min. air temperature:	-26.6°C	Avg. air temperature:	5.2°C

Use the drop-down menus below to control which data are displayed on the chart and included in the statistics to the left.

All data from this USGS Data Release.

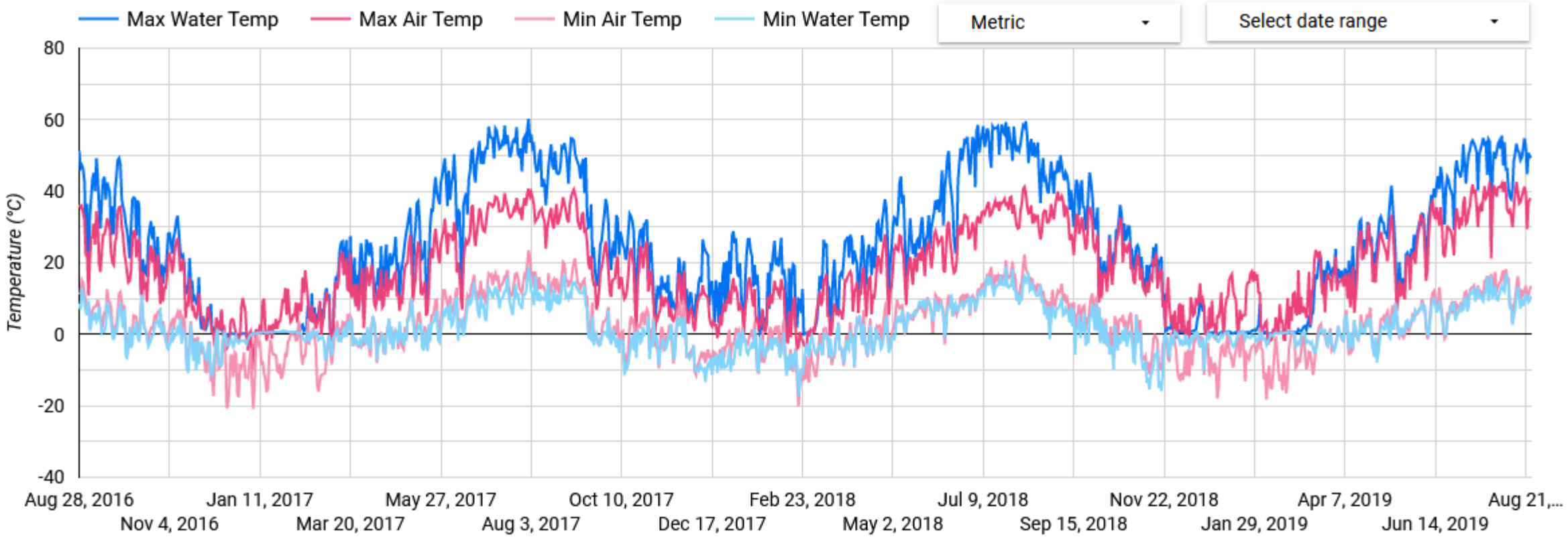


Stream and air temperature from Lower McDermitt Creek, Oregon

Max. water temperature:	60.3°C	Max. air temperature:	42.8°C	Avg. water temperature:	13.4°C
Min. water temperature:	-17.3°C	Min. air temperature:	-20.9°C	Avg. air temperature:	10.2°C

Use the drop-down menus below to control which data are displayed on the chart and included in the statistics to the left.

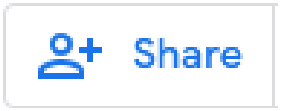
All data from this USGS Data Release.



Step 6: Share the Data Studio pages

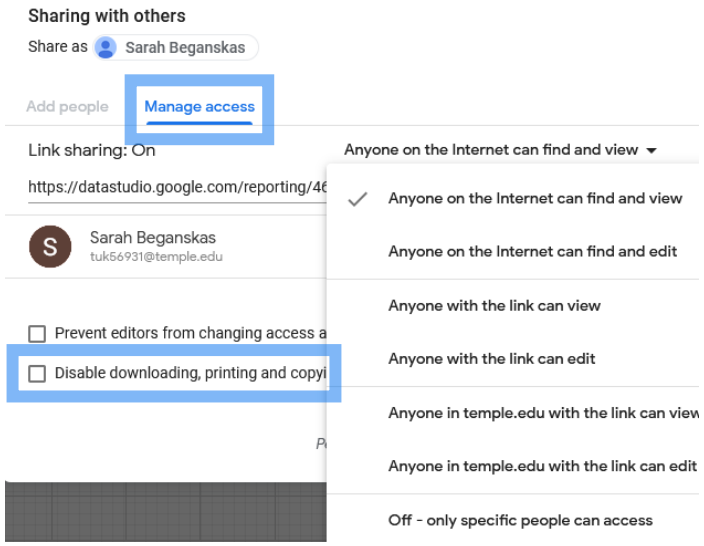
For each Data Studio report you created:

1. Click Share in the upper right.



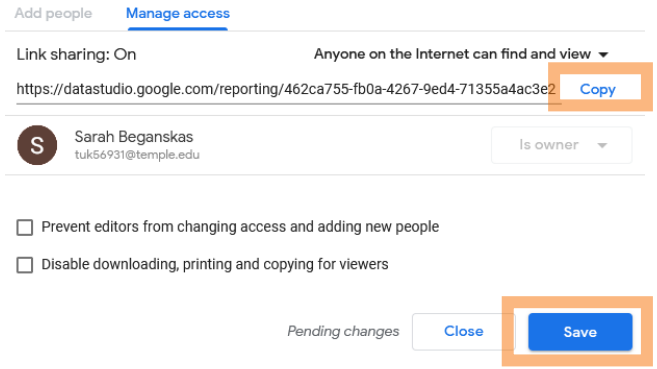
2. Click **Manage access**. Then choose the most appropriate sharing settings.

Check the Disable downloading… box to prevent others from downloading your data.



3. Click **Copy** and then **Save**.

If you do not click Save, the sharing settings will not take effect.



4. Share this link with others as desired (we will use it in Part 2 of this tutorial).

Wrapping up

This tutorial just covers the basics! Google Data Studio has many additional capabilities, and there are resources available online for how to use specific tools not covered here.

Part 2 of this tutorial covers how to link these DataStudio pages to an interactive map.

This project is led by Temple University and funded by the William Penn Foundation.