Getting Started with CODAP

A Beginner's Guide to Using CODAP

CODAP

Common Online Data Analysis Platform

The Concord Consortium

Getting Started with CODAP

What is CODAP?

CODAP (Common Online Data Analysis Platform) is a free, open-source, internet-based tool from the team at Concord Consortium which allows users of all ages and skill sets to analyze and interpret data with ease! This handbook will help you become familiar with the *basics* of CODAP. To learn about all of the available features and tools check out the official library of **CODAP How-to Guides** offered on their website.

Purpose of this Handbook

This handbook has been created to help new users become familiar with using CODAP, with a focus on the most basic and commonly used tools and functions that are available in the platform. Once you have mastered these CODAP basics, we encourage you to explore the more advanced features available on the CODAP website. We have listed and linked some of these resources on Page 16.

Let's get started with CODAP!

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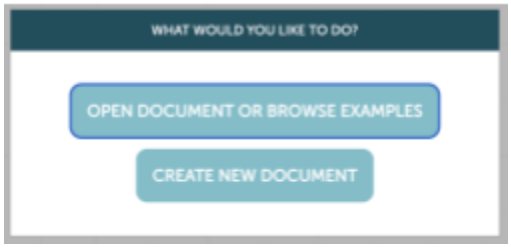
Opening CODAP

To open CODAP, you will:

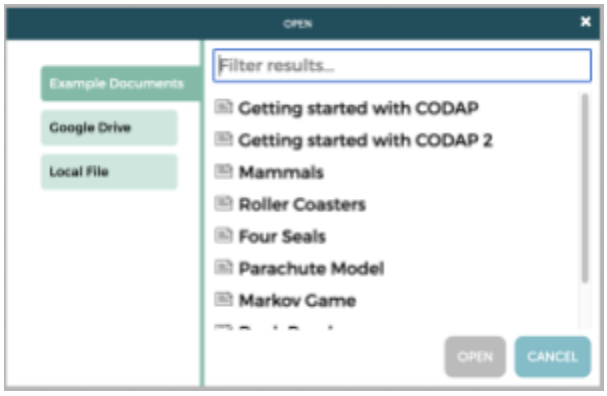
1. Navigate to the CODAP Launch Page: https://codap.concord.org/
2. Click the “Launch CODAP” icon in the upper right corner.
3. Select which option from the Launch Page best fits your needs:
    a. Open Document or Browse Examples
    b. Create New Document



“Open Document or Browse Examples”

This launch option will allow you to open an existing CODAP file. You can either:

1. Open a preloaded CODAP file provided by Concord Consortium. These files are intended to showcase what users can do in CODAP.
    TIP: The two “Getting Started with CODAP” files in this menu are great for new users!
2. Open an existing CODAP file that you have created and saved in your Google Drive or as a Local File



“Create New Document”

This launch option will allow you to create a new CODAP file. Clicking this launch option will open a blank CODAP file in your browser. Throughout the rest of this handbook, we will show you how to build and save your CODAP file. In the next section, we’ll start with a tour of the basic tools available to use in your new CODAP file.

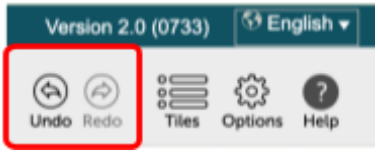
CODAP Tools & Features

When you open a CODAP file, you will always see the following toolbar along the top of your screen:

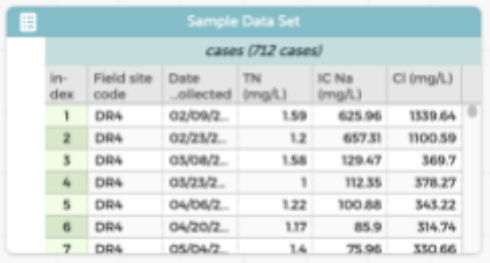
In this handbook, we will not explore all of these tools. For more information about these excellent tools and how to use them, check out the official library of [CODAP How-to Guides](#).

The tools that we will describe and use in this handbook are:

- Tables
- Graph
- Drop-down menu
- Undo & Redo



Importing the Data into CODAP



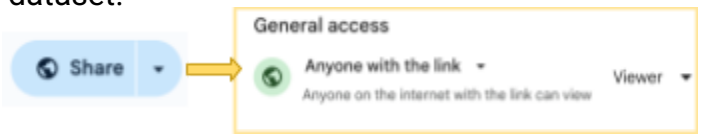
Importing data into your CODAP file can be done using several different methods. Strengths and limitations of each method are included in the guides that follow. You will know if your data import was successful if a fully-populated data table appears in your CODAP workspace after you have completed all of the outlined steps. You can have multiple tables (data sets) in one CODAP file.

Dragging and Dropping Data

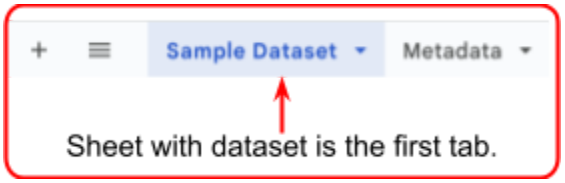
Data can be imported into the CODAP file using two different "drag and drop" methods:

<u>Method #1: Drag and Drop a Google Sheets link</u>

To use this method, the following *must* be true about the dataset:



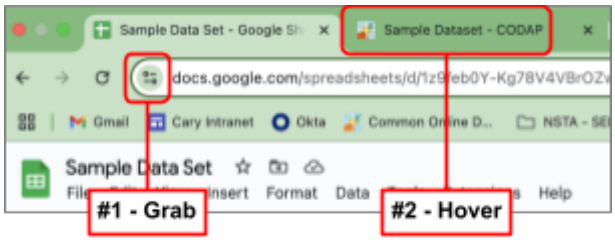
1. The "Share" settings of the Google Sheet file must be changed to "Anyone with the link can view"
2. The dataset must be the first or only tab (a.k.a. sheet) in the Google Sheet file. When you import a Google Sheet file with multiple tabs/sheets, only the first tab will populate the CODAP data table.

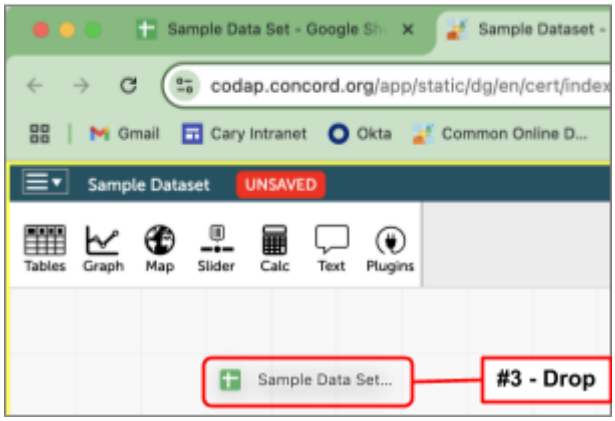


TIP: You can rearrange the order of tabs/sheets in Google Sheets by dragging and dropping the tabs along the bottom of the file.

Steps for Dragging and Dropping Google Sheet

1. "Grab" the site information icon in the URL bar
2. Hover over the CODAP tab in your browser until the CODAP window pops up
3. "Drop" the data anywhere in the CODAP workspace.





Troubleshooting

If your table is populated with an error message rather than data, check that your Google Sheet is correctly shared. If that does not fix the problem, try one of the other data import methods.

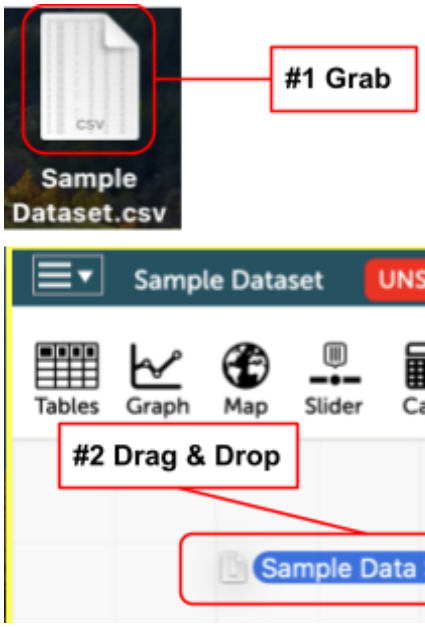
One benefit of this data import method is that you can share the data with your students via link. This can be advantageous if students are not allowed to download files to their school devices. **Some limitations and drawbacks** include the need for a teacher Google Account and the possibility of errors due to incorrect data formatting.

Method #2: Drag and Drop .csv file

To use this method, the data *must* be in .csv format. Excel files (.xlxs) and other formatting are not compatible with CODAP. If your current dataset is not in .csv format, you will need to save or download it as a .csv file first. We have provided a step-by-step guide at the bottom of this page.

Steps for Dragging and Dropping a .csv file

1. "Grab" the .csv file from your device.
   TIP: If you can't find the file, try checking your downloads folder.
2. Drag and "Drop" the data anywhere in the CODAP workspace.



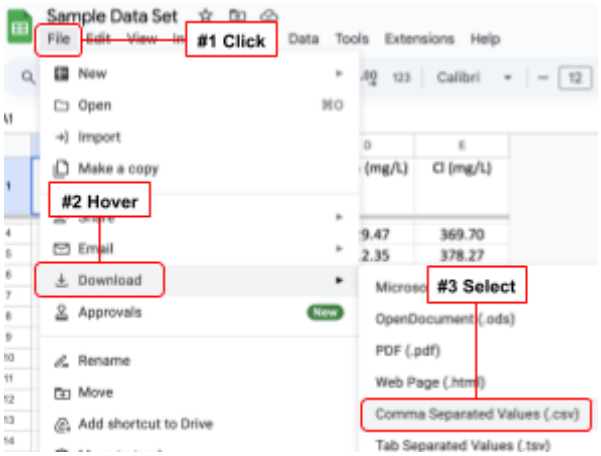
One benefit of this data import method is that it can circumvent possible formatting/sharing issues that sometimes come up in the Google Sheet Drag and Drop method. **Some limitations and drawbacks** include the extra step(s) associated with .csv formatting. Additionally, if students are prevented from downloading files on their device, then they will not be able to use this method.

Converting to a .csv file

NOTE: For both Google and Excel, the dataset must be the "active" tab/sheet in the file before you begin the .csv conversion.

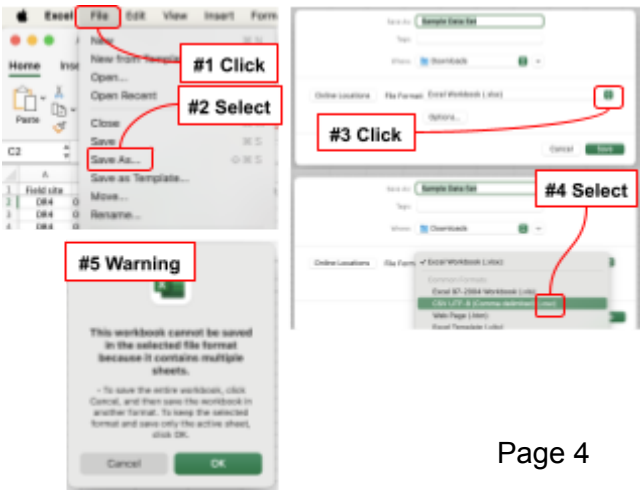
If your dataset is in Google Sheets:

1. Click "File"
2. Hover over "Download"
3. Select "Comma Separated Values (.csv)" from the pop-out menu.
   TIP: Save yourself a stp and try using the Google Sheet Drag and Drop method!



If your dataset is an Excel file:

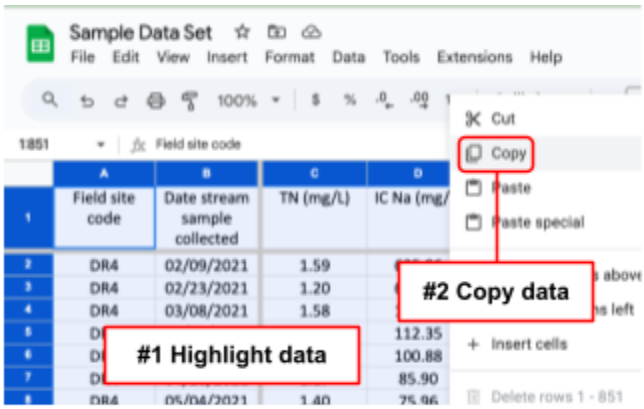
1. Click "File"
2. Select "Save As"
3. Click the "File Format" drop-down
4. Select the (.csv) file type from the menu.
   NOTE: If your workbook has multiple worksheets, you will receive an error message reminding you that only the active sheet will be saved.



Copy and Pasting Data into CODAP

You can copy and paste data into CODAP using a Tables tool:

1. Select the data from your existing sheet.
2. “Copy” the highlighted data.
3. Click on the Tables icon in CODAP
4. Select “-- new from clipboard --“ from the drop down menu



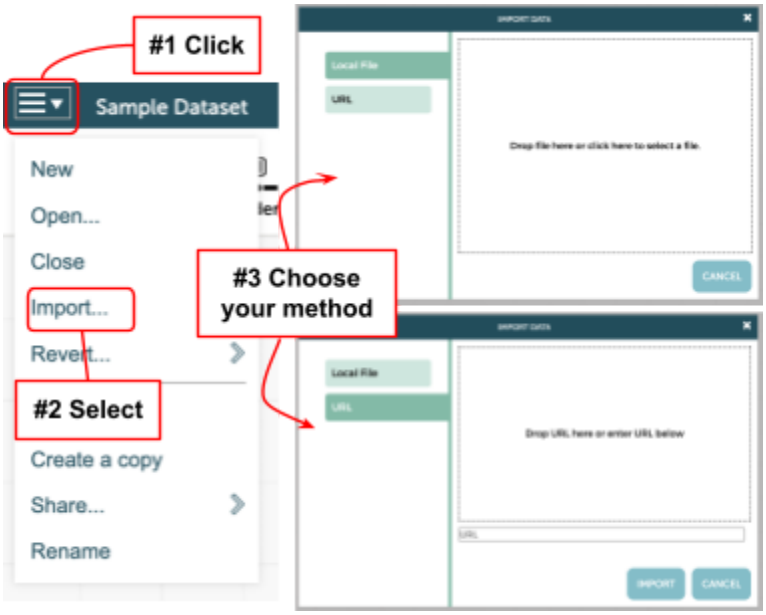
One benefit of this data import method is that it circumvents possible formatting/sharing and download issues that sometimes come up in the Drag and Drop methods. It also does not require any special formatting steps. **Some limitations and drawbacks** include lost data if students are not careful to “capture” all of the information in the worksheet.

Importing Data from CODAP Menu

You can use the “Import” function from the Drop-down menu to import data from either a .csv on your device or a Google Sheet.

1. Click on the Drop-down menu in CODAP
2. Select “Import…”
3. From here you can choose how you want to import your data.
    a. .csv can be searched for or dragged and dropped
    b. Google Sheet URLs can be copied and pasted

This data import method has the **same limitations and drawbacks** as the Drag and Drop methods.



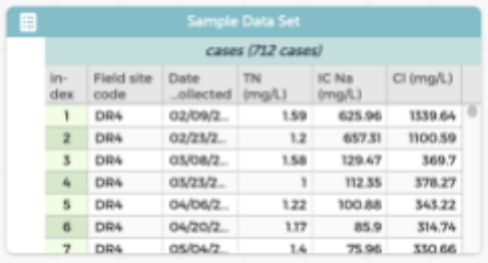
<u>Summary of “Importing the Data into CODAP”</u>

You have many options when it comes to choosing a method for importing data into CODAP:

1. Drag and Drop using a Google Sheet or .csv file
2. Copy and Paste from an existing Excel file or Google Sheet
3. Use the CODAP Import tool to find and import the data

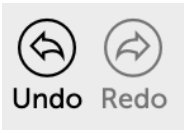
Each method has its own benefits and limitations, so be sure to choose the one that’s right for you and your students!

Exploring the Data with CODAP



Now that you have successfully imported your dataset (you have a populated data table in your workspace), you're ready to learn how to explore the data using CODAP! Remember, this handbook is a guide to *just the basics*. For more information on the full capabilities of CODAP, check out the official library of [CODAP How-to Guides](#).

In all of your CODAP data exploration, never forget your best friends, the Undo & Redo buttons! If you make a change–intentional or otherwise–that you don't like these buttons can prevent panic. Use them well!



CODAP Language Guide

Let's get to know a few specifics of the CODAP language!

- **Attribute** = a parameter or variable. The columns of the table are organized by attribute.
- **Case** = individual data "packet". In the table, a case is represented by a row of the table. In the graph, a case is represented by a data point.

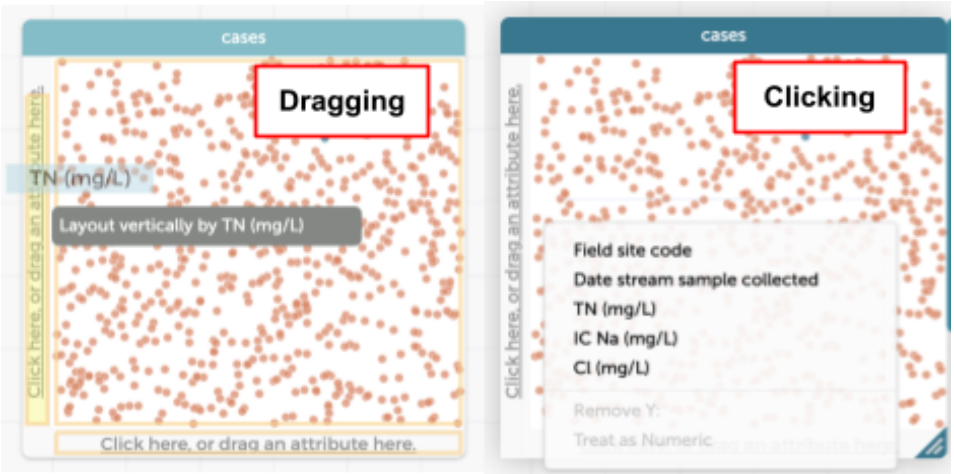
Create a Graph

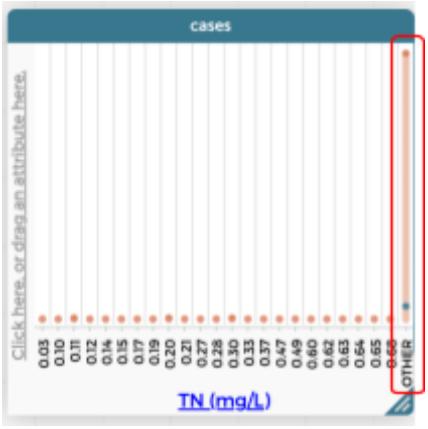
Click "Graph" in the CODAP Toolbar. When you do, a graph will appear. There will be no axes labels, and your data points will be arranged in a completely randomized way.

Adding Attributes to Axes

You can add attributes to axes in two ways:

1. Drag the attribute name from the top of the table and drop it on the axis of your choice. If you drag the attribute to and hover over the graph, different areas of the graph will highlight yellow, and a pop-up will appear describing the action that will occur if you drop the attribute in that space.
2. Click on the axis and select your attribute from the drop down list. If you do not see the attributes associated with your table, look for another pop-out menu called "cases."

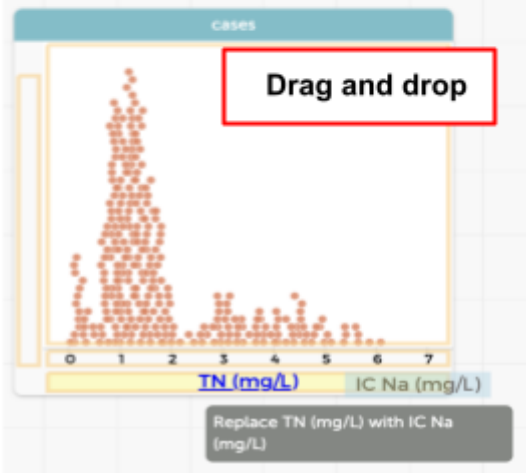




You may find that adding an attribute results in a strange configuration in the graph. If you see a configuration that looks like ← this, it means that a numeric attribute is being treated as categorical (i.e. a value of 0.03 is one "category" and 0.10 is another).

You can change this in the table:

1. Click the attribute name at the top of the table
2. Select "Edit Attribute Properties…"
3. Click on the "type" drop-down menu
4. Select "Numeric"



Removing Attributes from Axes

You remove attributes by clicking on the attribute name in the axis and selecting "remove from axis."

Replacing Attributes on Axes

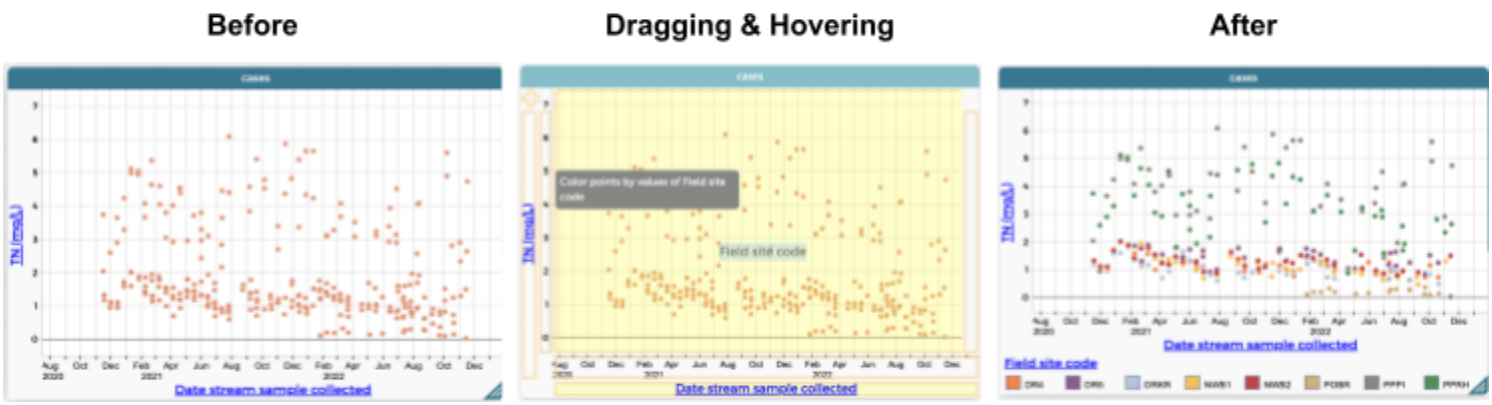
You can swap out attributes by:

1. Clicking on the attribute name in the axis and selecting the desired attribute from the pop-out menu.
2. Dragging and dropping the attribute over the old one.

    NOTE: On the y-axis, you can add a second attribute, so make sure the pop-up dialog box indicates that you are replacing the attribute and not adding it.

Color-coordination! Adding a Legend or Key to the Graph

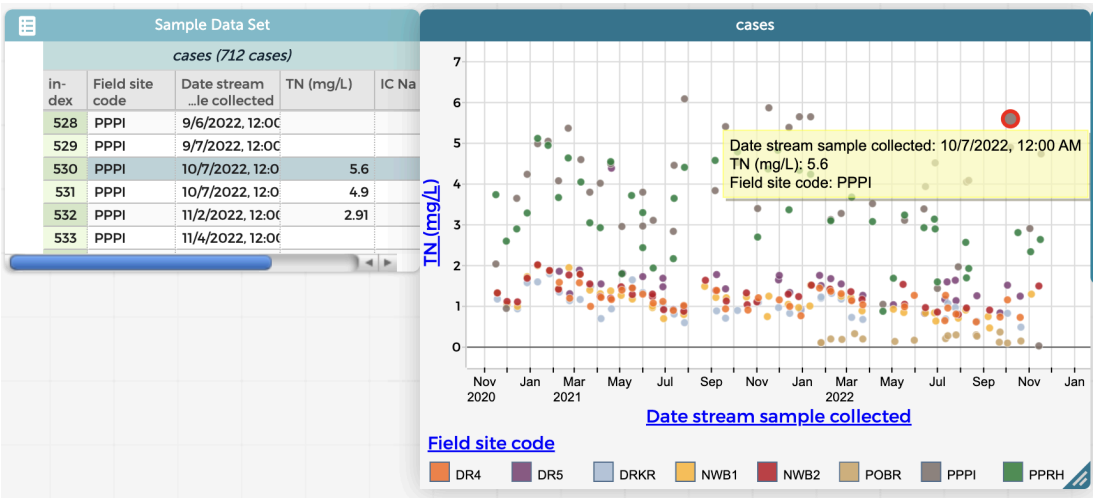
You can color-code by attribute as well. This is particularly effective if you want to filter the data by a categorical attribute. To create a legend, simply drag the attribute name from the top of the table and drop it in the middle of the graph.

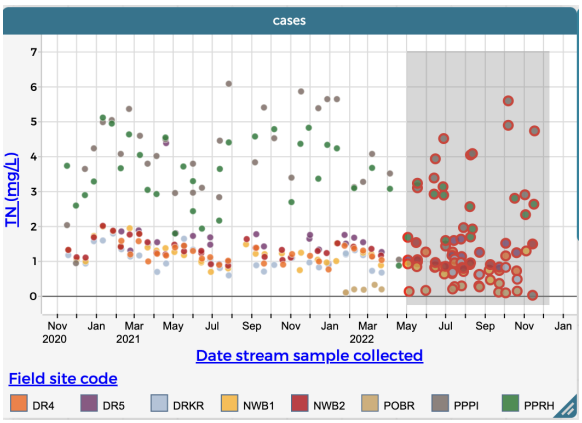


To remove or replace a legend, follow the same steps as you would for removing or replacing an attribute on an axis.

Selecting Data

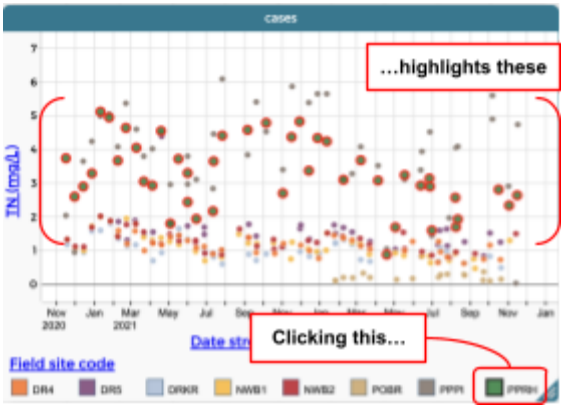
Clicking on a single data point in the graph will highlight the point on the graph as well as its corresponding row in the table. Hovering over a data point will also give you a pop-up dialogue that describes the attributes that are currently being used in the graph.

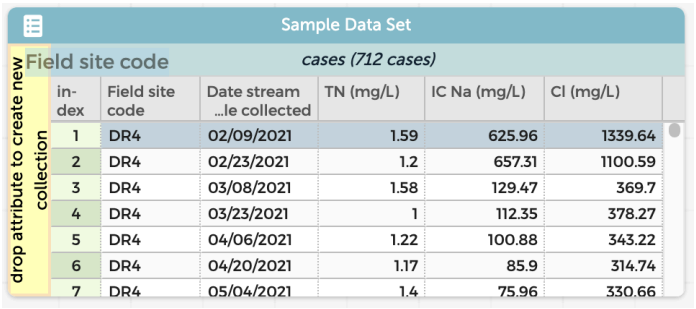




You can also select multiple data points at once by clicking in the graph and dragging to create a rectangle that will select all data points within that area. All of the corresponding rows in the table will also highlight.

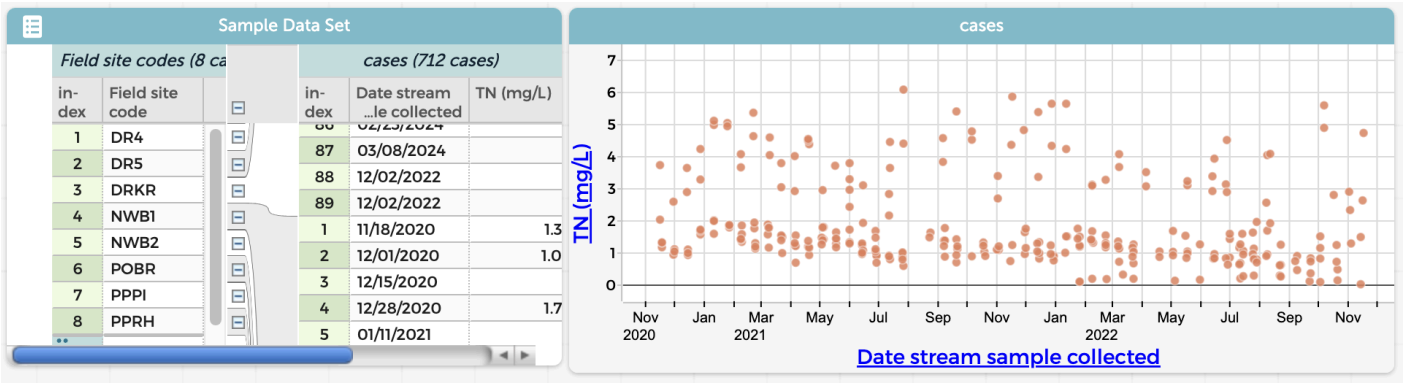
If working with categorical attributes, you can also select multiple data points by clicking on one of the categories in the legend.



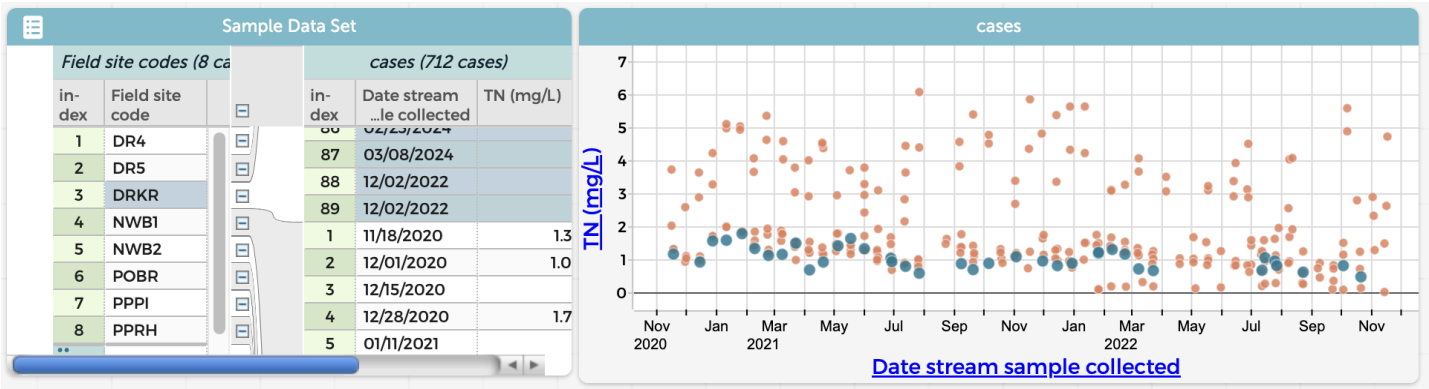


Finally, you can “collect” categorical data into groups in your table. This will help you to select a complete set of categorical data in the graph, even if it hasn’t been filtered using the legend. To create a collection of categorical data in the table, drag the attribute name to the left of the “index” column. You will see a yellow message appear along the side of your table, shown here.

This will result in a small pop-out that contains your collections (in the example shown below, it is the attribute “Field Site Code”).

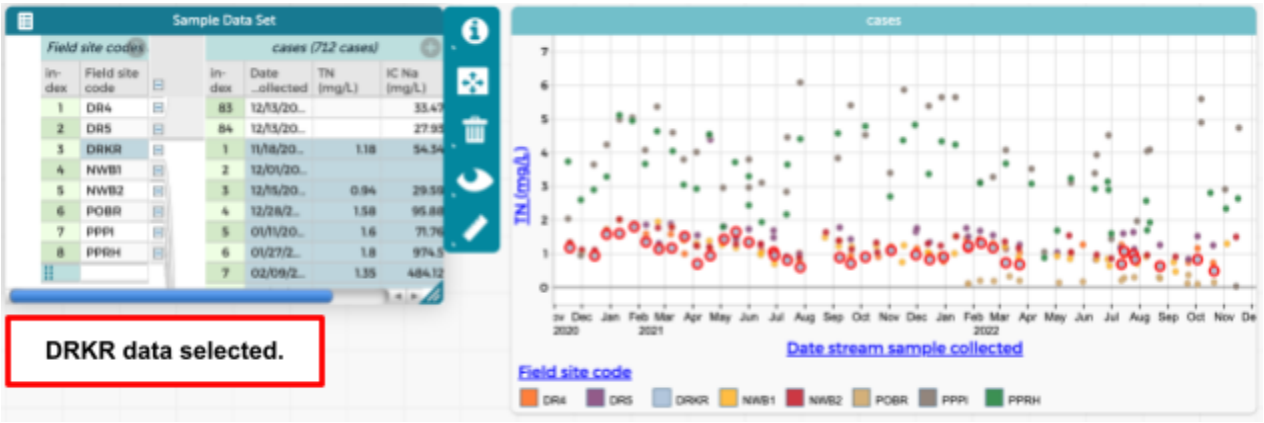


Now, by clicking on a particular field site code in the collection, those points become highlighted in the graph and the table.



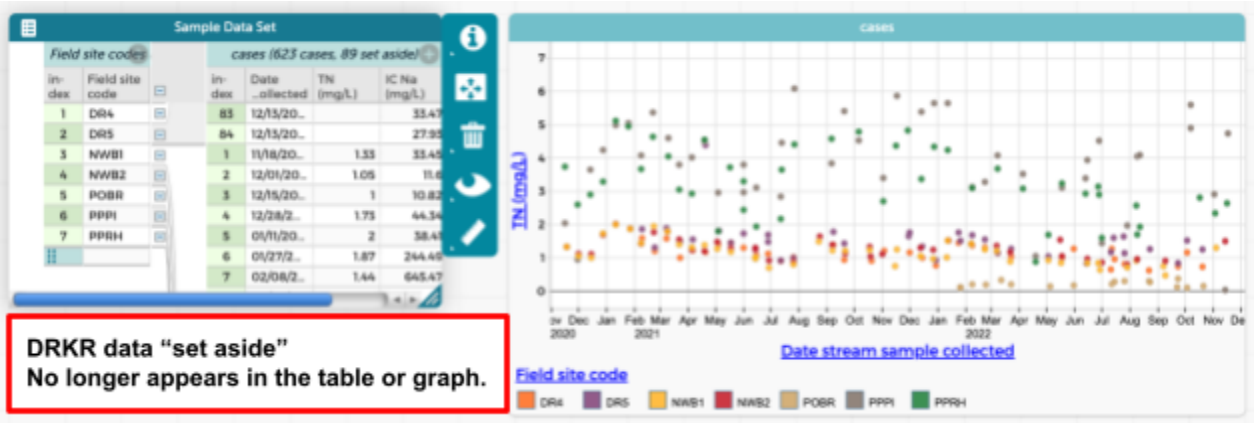
What to do with Selected Data?

Once we have selected certain data points, we can filter and sort our data even further. In the previous example, we had selected the DRKR site data. Here is the same dataset, but with the Field site code reestablished:



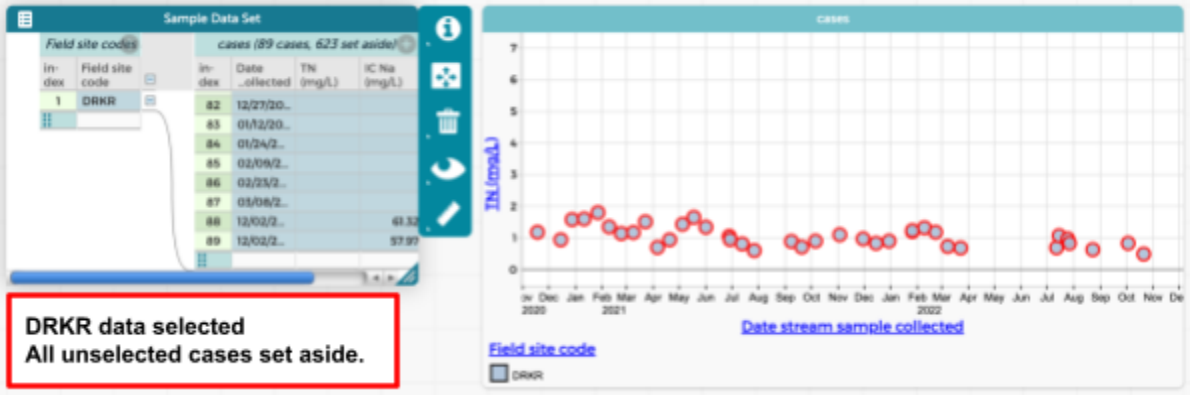
From here, we can sort using the “Inspector Palette” (the pop-up toolbar) in either the graph or the table.

Using the Inspector Palette for the table, you can “set aside” particular data. For example, if the DRKR dataset is selected and we “Set Aside Selected Cases,” all of the DRKR data will be removed from our graph and hidden from the table:

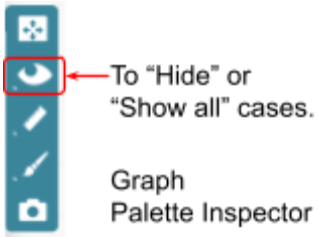


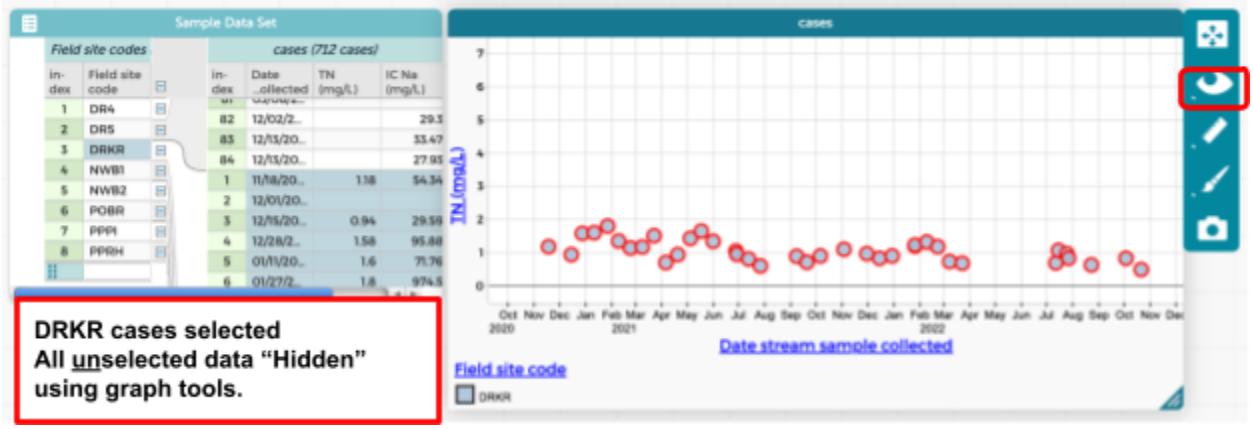
The data that has been set aside can be restored using the same tool - simply select “Restore # cases” from the same menu option in the Inspector Palette.

You can also set aside all of the unselected cases using this method by selecting “Set Aside Unelected Cases” from the menu in the Inspector Palette:



A similar method of hiding cases can be accomplished using the Inspector Palette in the graph. Hiding cases using this method only hides the data on the graph, and does not set aside the cases in the table:





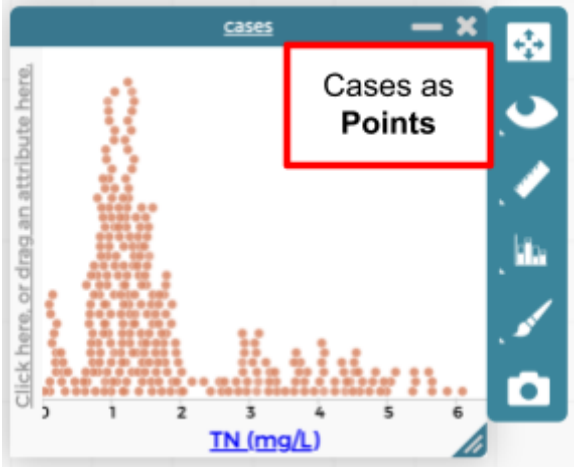
The difference between these functions may lead to additional differences in higher-level CODAP functions, but that is beyond the scope of this handbook. To learn more, we suggest that you check out the official library of **CODAP How-to Guides**.

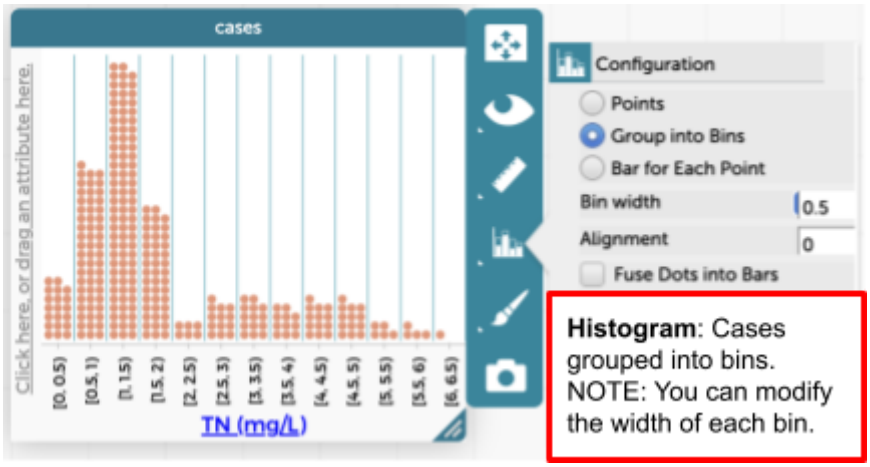
You may have noticed that the table and graph Inspector Palettes are slightly different. The tools offered by the graph Inspector Palette change, based on how the data is arranged. In the following subsections, we will introduce additional tools, tips, and tricks for getting started with data analysis in CODAP.

Single-Attribute Graphs

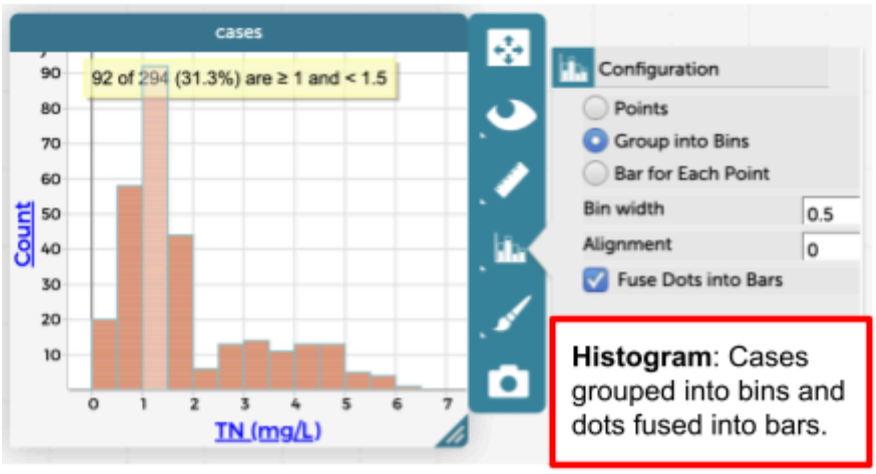
When working with single attribute graphs, you will notice a new tool pop up on the graph Inspector Palette: 

This tool allows students to investigate the parameter configured as points, a histogram, or a graph in which each point is treated as its own bar. The tool best suited for the job will depend on the data you are using. The examples shown here use Total Nitrogen (TN) - a numerical attribute.





Fusing the dots into bars (below, left) adds a count parameter to the other axis. Hovering over one of the fused bars provides students with information about that particular bar. Creating a bar for each point (below, right) graph arranges the cases by the order in which they appear (spatially) in the table; if you have created collections in your table, that will impact the arrangement.

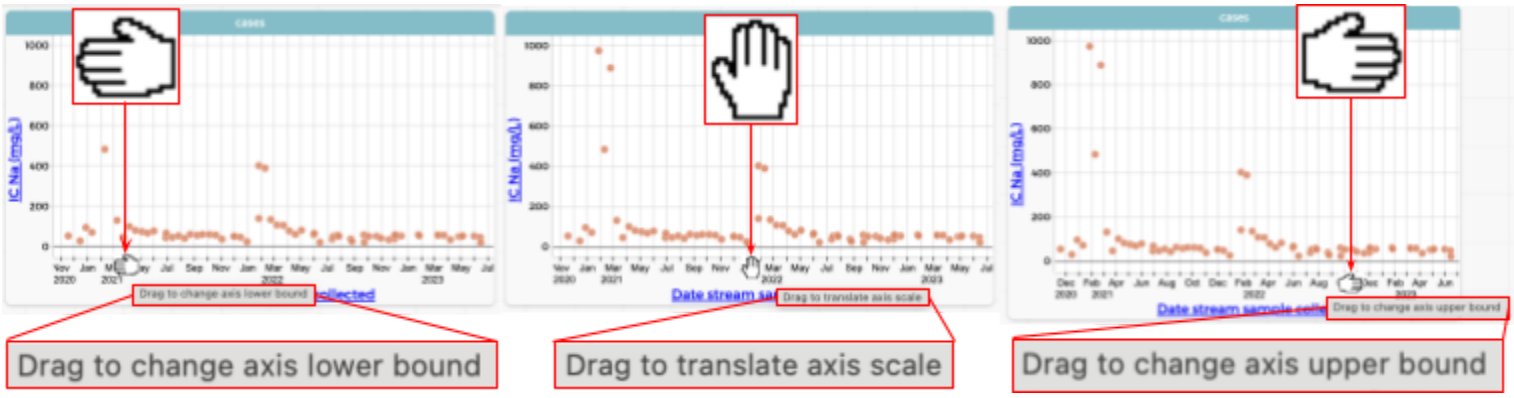


Changing Graph Scale and Size

You can drag to change axes scales to increase or decrease the resolution of the axes:

1. Hover your cursor over the appropriate area of the axis until the hand icon and/or desired message pops up (see approximate placement of the hand icon or each action, below).
2. lick but do not release to grab and drag (the hand will change into a fist).

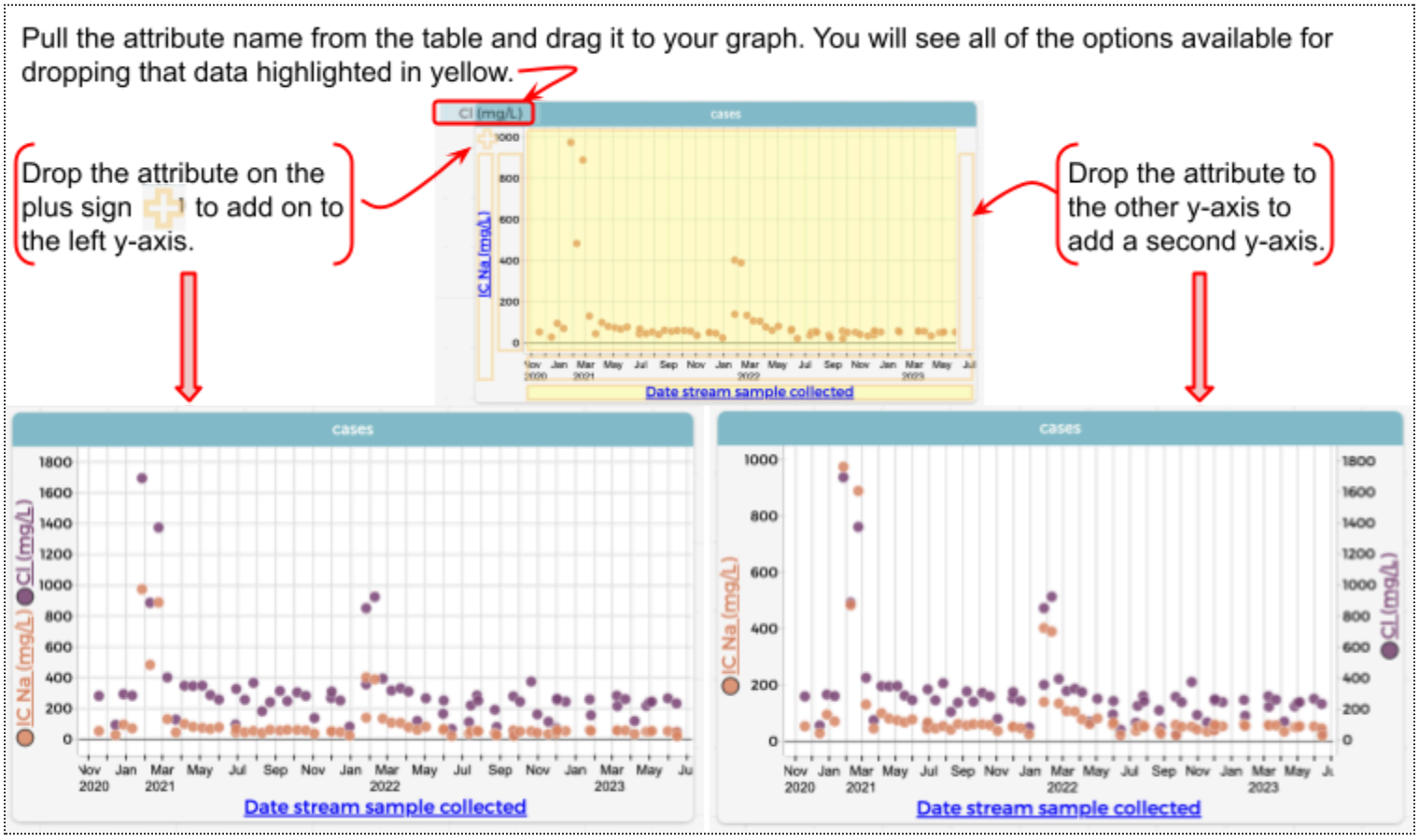
Translating the axis will allow students to view all the data if their boundary changes stretch the axes beyond the view screen of the graph. The images below illustrate what this looks like on the x-axis, but similar pop-ups appear when you hover over the y-axis.



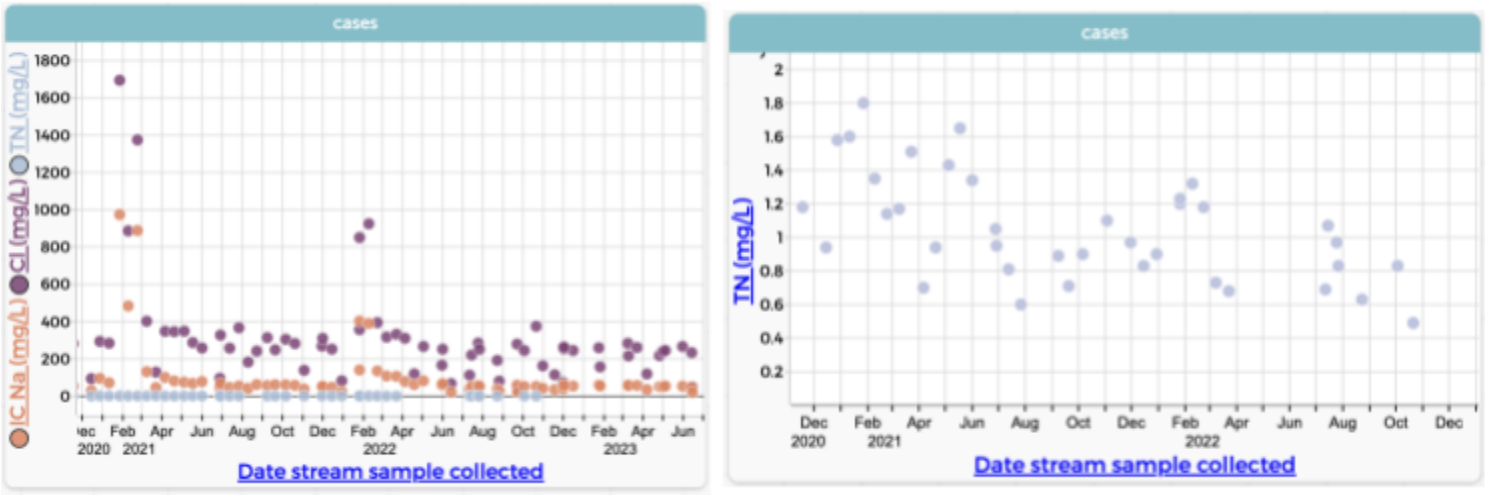
To make the graph larger or smaller while maintaining the scale of your axes, grab the lower right corner of the graph and drag to the desired proportion. If you don't see the indicated artifact in the corner of your graph, you need to click on the graph so that the Palette Investigator pops up.

Graphing Multiple y-axis Attributes

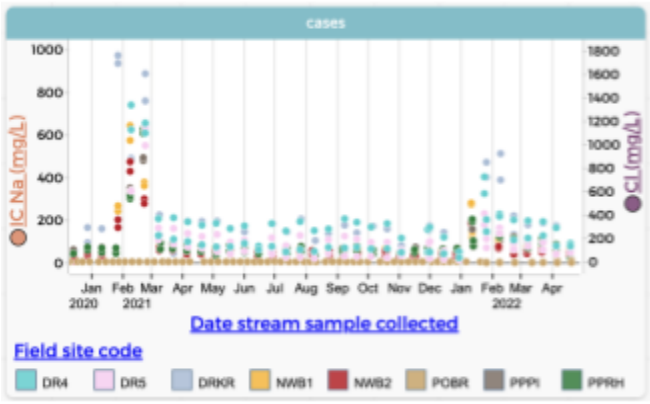
CODAP allows you to compare multiple y-axis attributes across one x-axis attribute. The style and limitations of these multi-parameter comparisons depend on the type of data and the scale of the values. For simplicity, only the DRKR site data is used in the examples below.

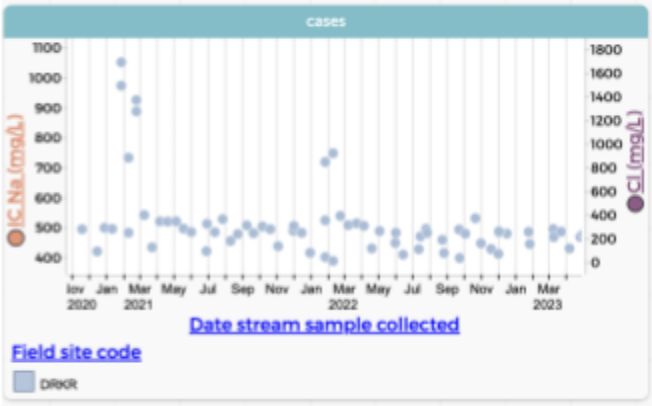


One limitation of plotting multiple y-axis attributes is evidenced in the graph shown below, left. Though Na, Cl, and TN are all measured in mg/L, the measured TN concentrations are on a much smaller scale than those of Na and Cl, and so it is difficult to see significant changes in TN concentration when plotted with Na and Cl.

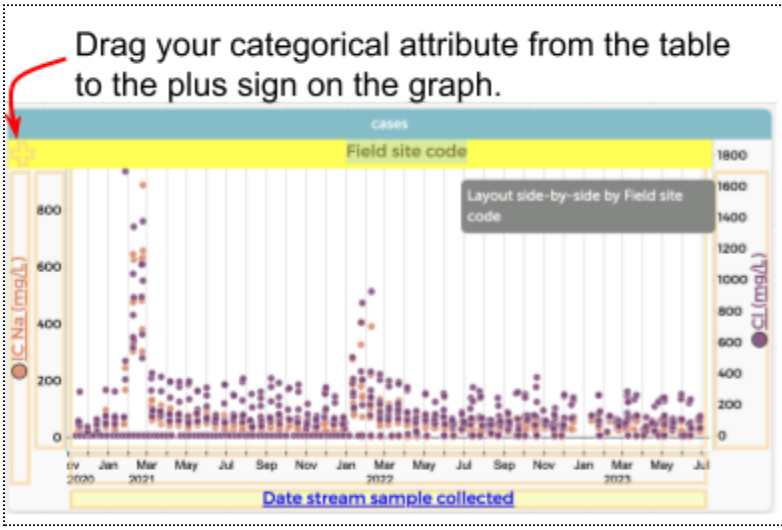


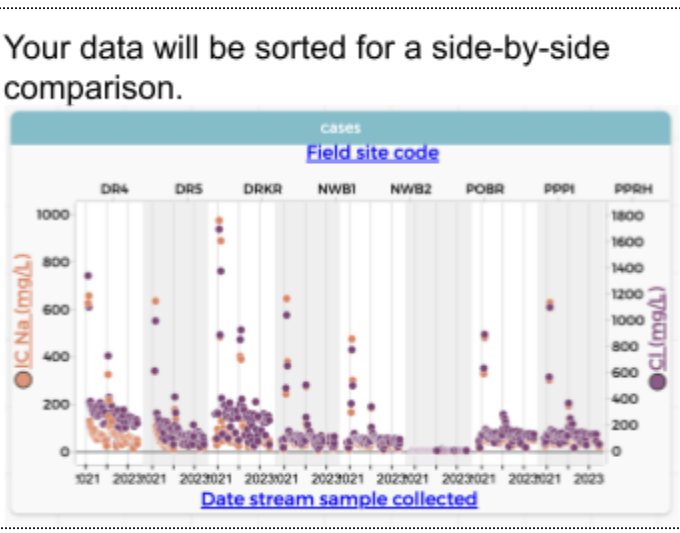
Another limitation occurs when you plot multiple y-axis parameters and include a legend with your graph. The legend color code will supersede the color coding of the y-axes, even if only one category exists in the legend.

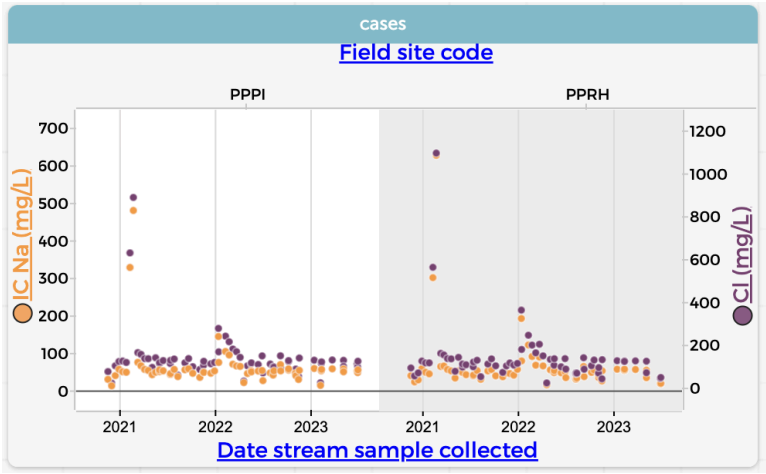




You can add a categorical attribute to a graph with multiple y-attributes as an additional attribute (rather than as a legend) and this will separate the data into individual plots for each category, as shown below.







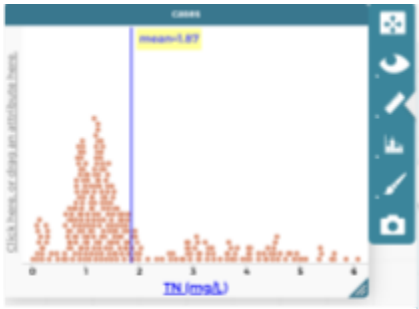
Depending on the number of categories in the attribute, your side-by-side may become squashed, as shown above, right. You could further filter the data using the Hide Selected Cases tool. In the example shown here, the side-by-side layout has been filtered to only include sites from the same area (the Pennypack - code PP).

Remember: this handbook is meant to serve as a guide to the basics of CODAP. There are so many cool things that you can do with your data in CODAP - the actions described here only just scratch the surface!

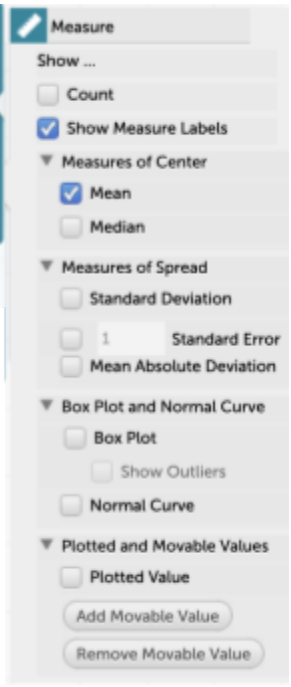
Statistical Tools

Which statistical tools you have available for your use will depend on what type of and how many attributes you have on your graph. Clicking on the ruler icon in the Inspector Palette will give you a pop-out menu of the tools available for you to use with the data in your graph.

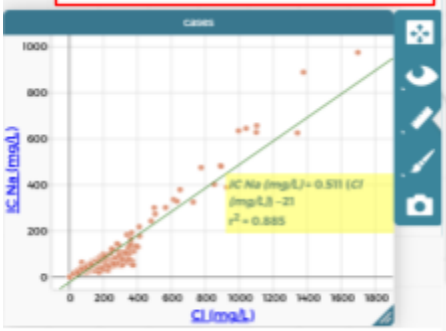
The pop-up menu for statistical analysis is shown for 1- and 2-attribute graphs, below.

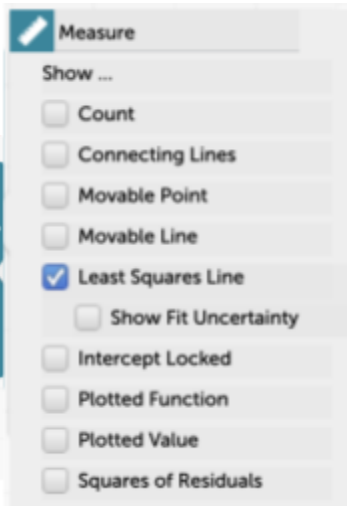


Measurement tools available for all configuration of single-attribute graphs *except* bins with fused bars.

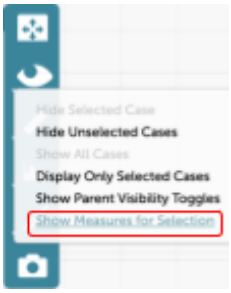


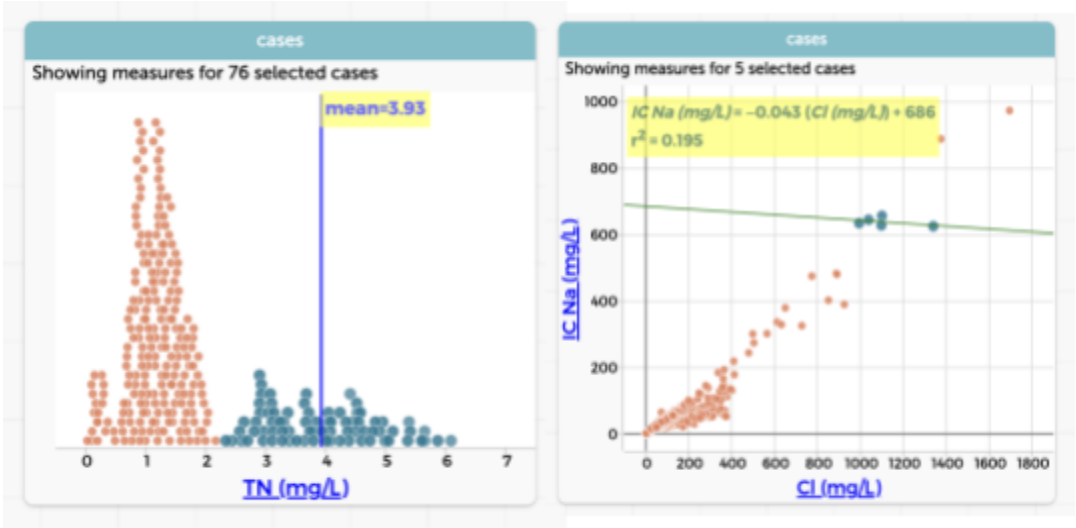
Measurement tools available for 2-attribute graphs.





You can also apply statistical measurement tools to a selection of data within the graph. To do this, click the eye icon on the graph Inspector Palette and click "Show Measures for Selection." Whatever statistical measurement tools you apply to the data will only be calculated for the data you select (for a reminder on how to select and unselect data, see pages 8 & 9). Examples are shown below for 1- and 2-attribute graphs.

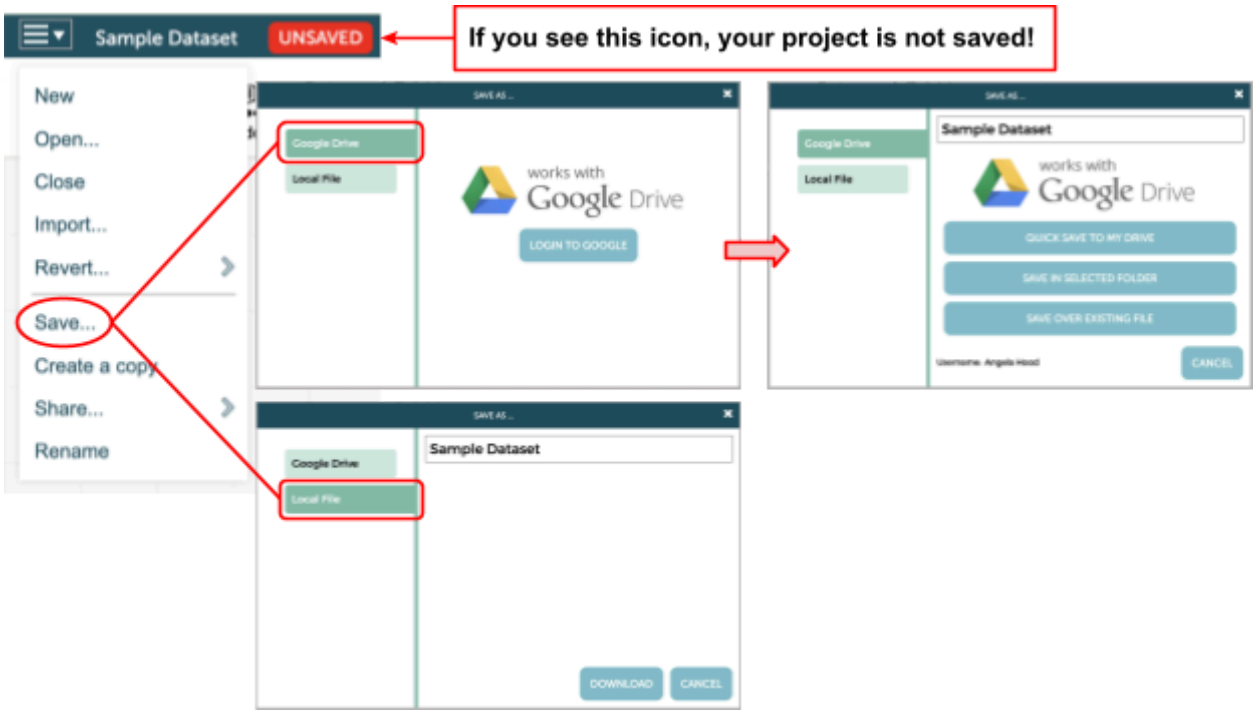




NOTE: CODAP provides a **comprehensive list** of available statistical measures in their Help section.

Saving and Sharing Your CODAP File

You can save your CODAP file to your Google Drive or to your local drive.



If you save your CODAP project to your Google Drive, you can access it by selecting the "Open Document or Browse Examples" option that pops up when you launch CODAP. This method is a good choice if your students are unable to download files onto their devices, and it will save your changes automatically in your Google Drive.

If you save your CODAP project as a local file, it will be downloaded to your device as a ".codap" file. The next time you launch CODAP, you can import your project file one of two ways:

1. Select "Open Document or Browse Examples" option when CODAP launches, and locate the file on your hard drive by browsing, or drag and drop the file.
2. Select the "Create New Document" option, and drag and drop the .codap file into the clean workspace area.

This option is a little riskier. If your computer, browser, or program shuts down unexpectedly, you will have to start over from the last saved file. So if using this method, be sure to save your project often!

You can also use either of these methods to build CODAP lessons and datasets with pre-populated data and other resources to share with your students. For educators using Google Classroom, you can even assign a CODAP document directly to your student in Google Classroom.

Additional CODAP Resources

We hope that you have found this handbook of CODAP basics useful. For the ultimate compendium of CODAP resources and supports, we recommend you start with the **CODAP Help Resources** webpage - here you'll find links to take you to the official CODAP **How-to Guides**, **FAQs**, and **Community Forums**. Crunch on, data rockstars!