

# Communicating with Data – Intro to Tableau

Dr. Ab Mosca (they/them)

# Plan for Today

- Intro to Tableau today, last Thursday's lecture this Thursday
- Introduction to Tableau
- Getting started:
  - Connecting to a data file
  - Creating views
  - Using "Show Me": a recommender system for views
- Exploring
- Discussion (time permitting)

# Checking in

- How did hwo1 go?
- hwo2 is released today!  
(<https://amoscao1.github.io/SDS-CS109/> > Homework > hwo2)

# Introduction to Tableau



- A drag-and-drop tool for mapping data dimensions onto visual dimensions
- Today we will learn:
  - How to load data into Tableau
  - A little bit about how Tableau organizes data
  - How to tell Tableau which facets of the data to display, and how

# What is + a b | e a u ?

- Visualization and business analytics software with a strong focus on **relational data**
- Idea originally developed at Stanford University
- Now owned by Salesforce

# What is + a b | e a u· ?

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What's relational data?

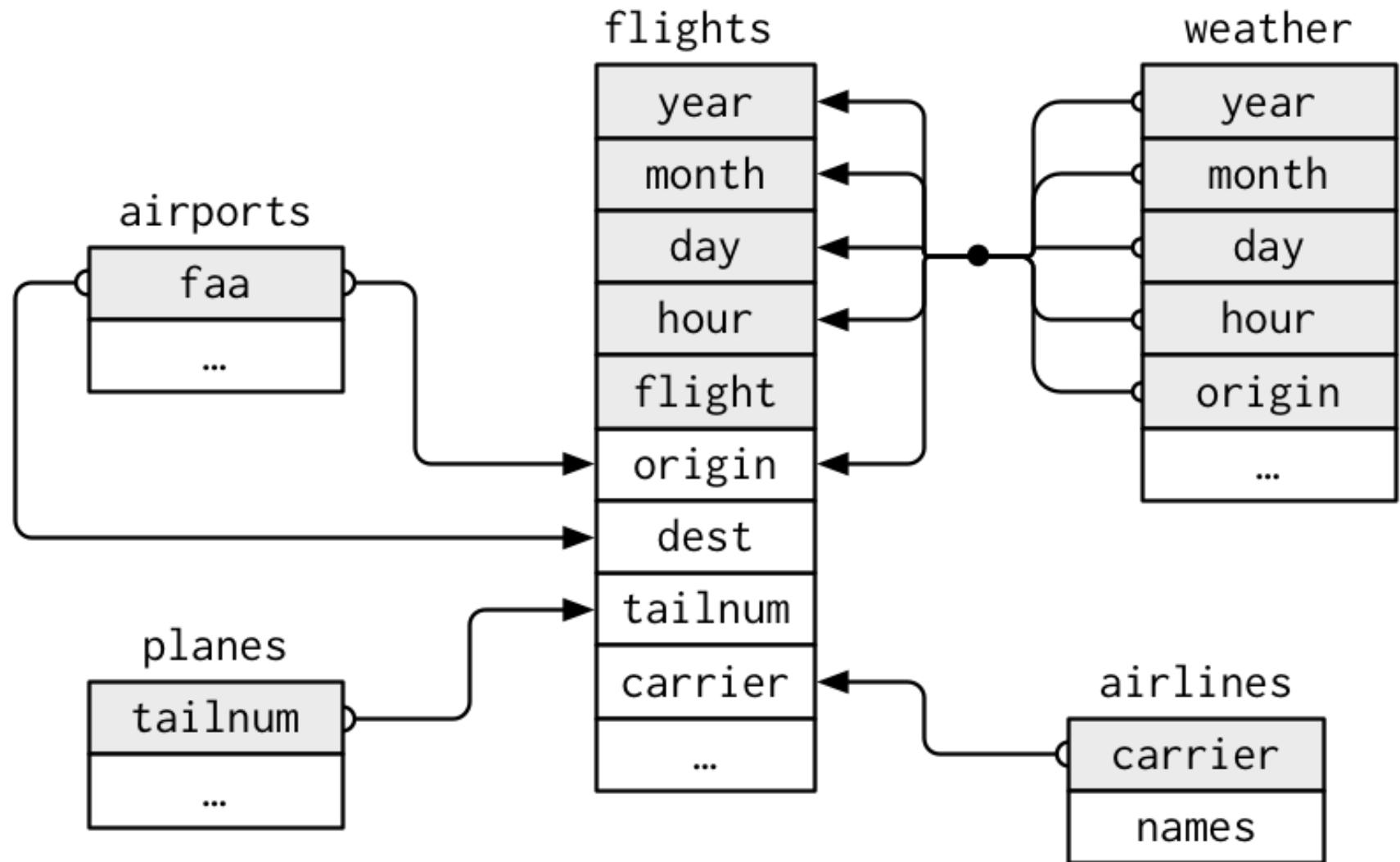
```
airlines
#> # A tibble: 16 × 2
#>   carrier name
#>   <chr>   <chr>
```

```
airports
#> # A tibble: 1,458 × 8
#>   faa      name          lat    lon    alt    tz dst tzone
#>   <chr>   <chr>   <dbl> <dbl> <dbl> <dbl> <chr> <chr>
```

```
planes
#> # A tibble: 3,322 × 9
#>   tailnum  year type      manufacturer model engines seats speed engine
#>   <chr>   <int> <chr>   <chr>       <chr>   <int> <int> <int> <chr>
```

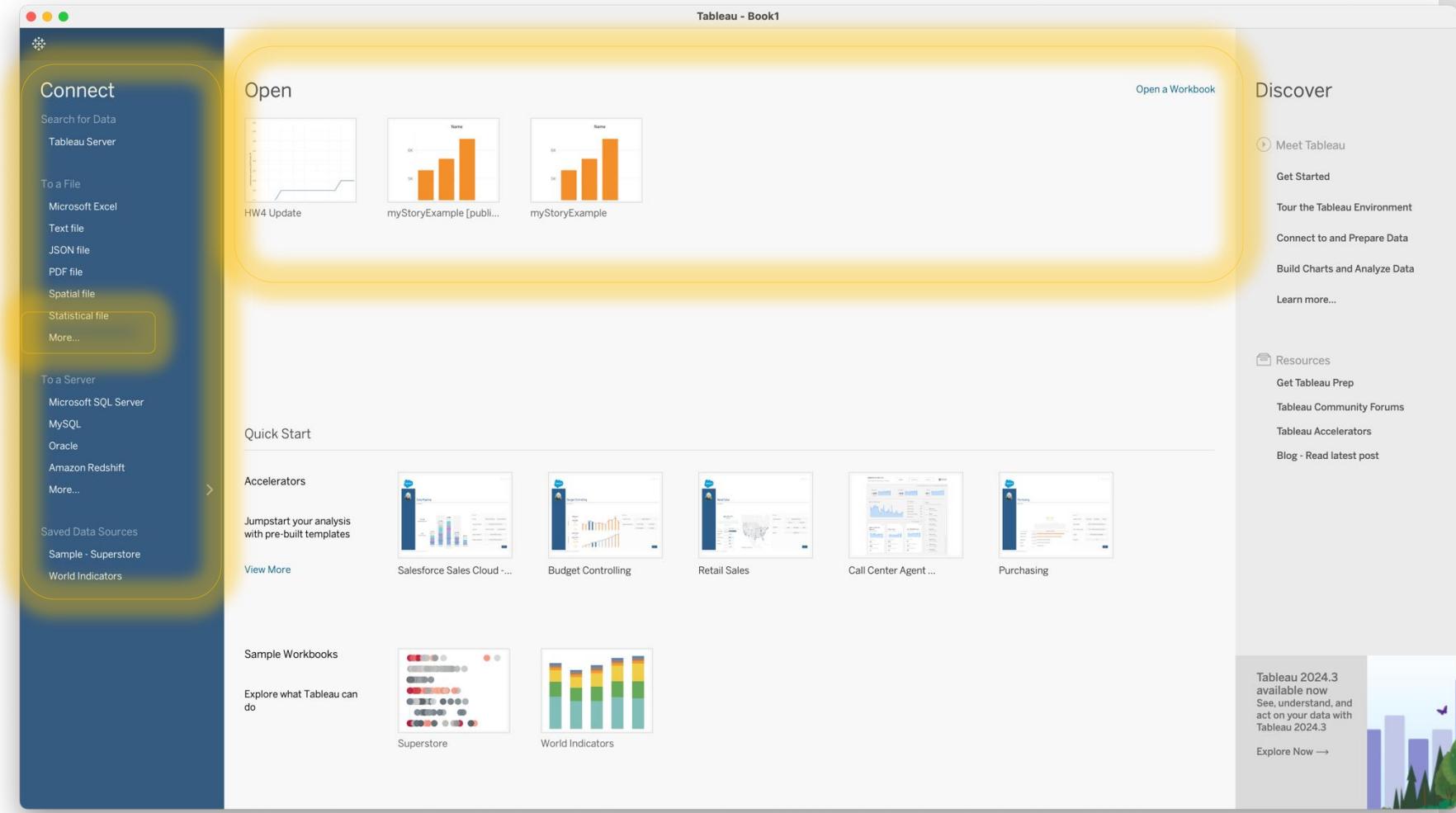
```
weather
#> # A tibble: 26,115 × 15
#>   origin  year month   day hour temp  dewp humid wind_dir wind_speed wind_gust
#>   <chr>   <int> <int> <int> <int> <dbl> <dbl> <dbl>   <dbl>   <dbl>   <dbl>
#> 1 EWR     2013    1     1     1   39.0  26.1  59.4     270    10.4     NA
#> 2 EWR     2013    1     1     2   39.0  27.0  61.6     250     8.06    NA
#> 3 EWR     2013    1     1     3   39.0  28.0  64.4     240    11.5     NA
#> 4 EWR     2013    1     1     4   39.9  28.0  62.2     250    12.7     NA
#> 5 EWR     2013    1     1     5   39.0  28.0  64.4     260    12.7     NA
#> 6 EWR     2013    1     1     6   37.9  28.0  67.2     240    11.5     NA
#> # i 26,109 more rows
```

# Relational Data



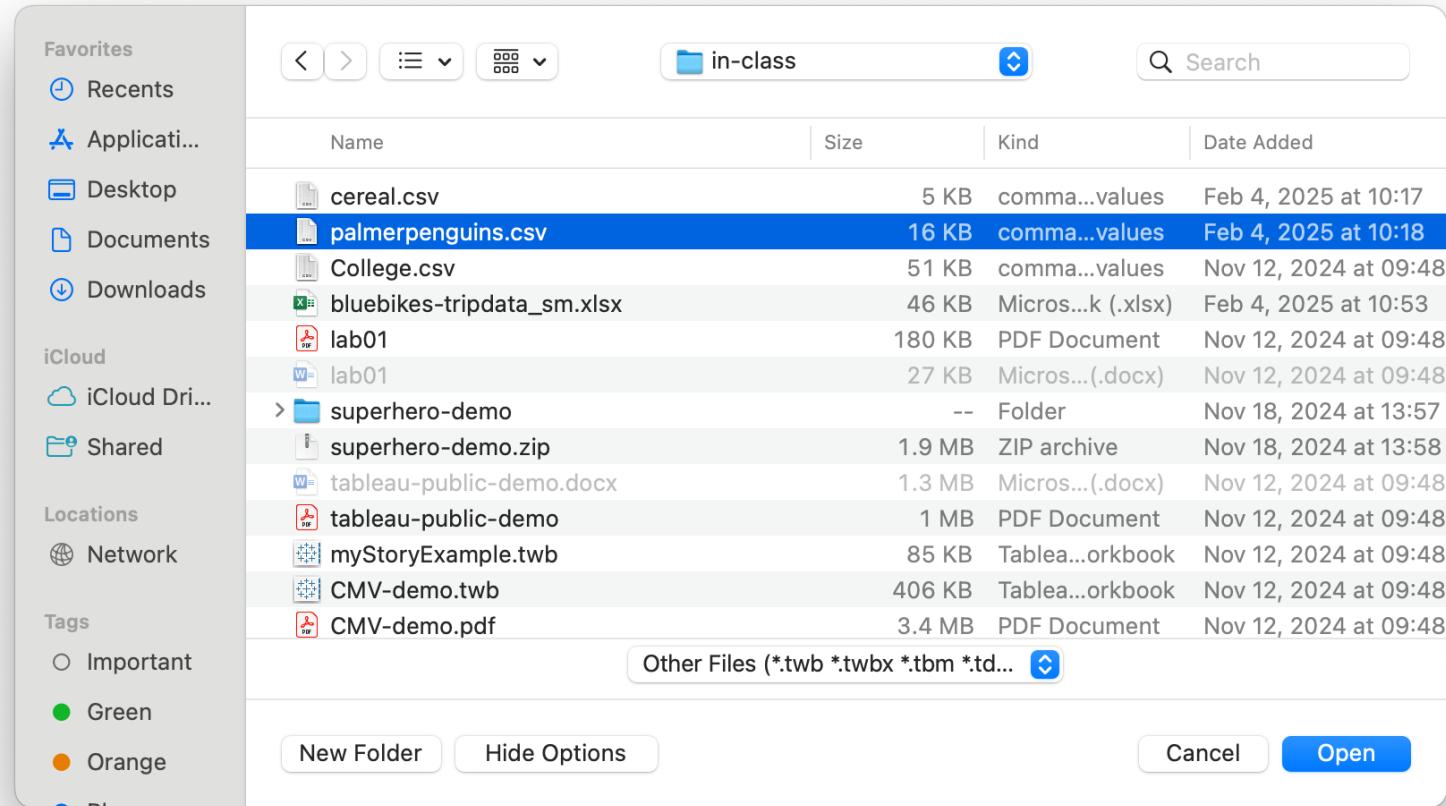
# Opening Tableau

## Tableau basics



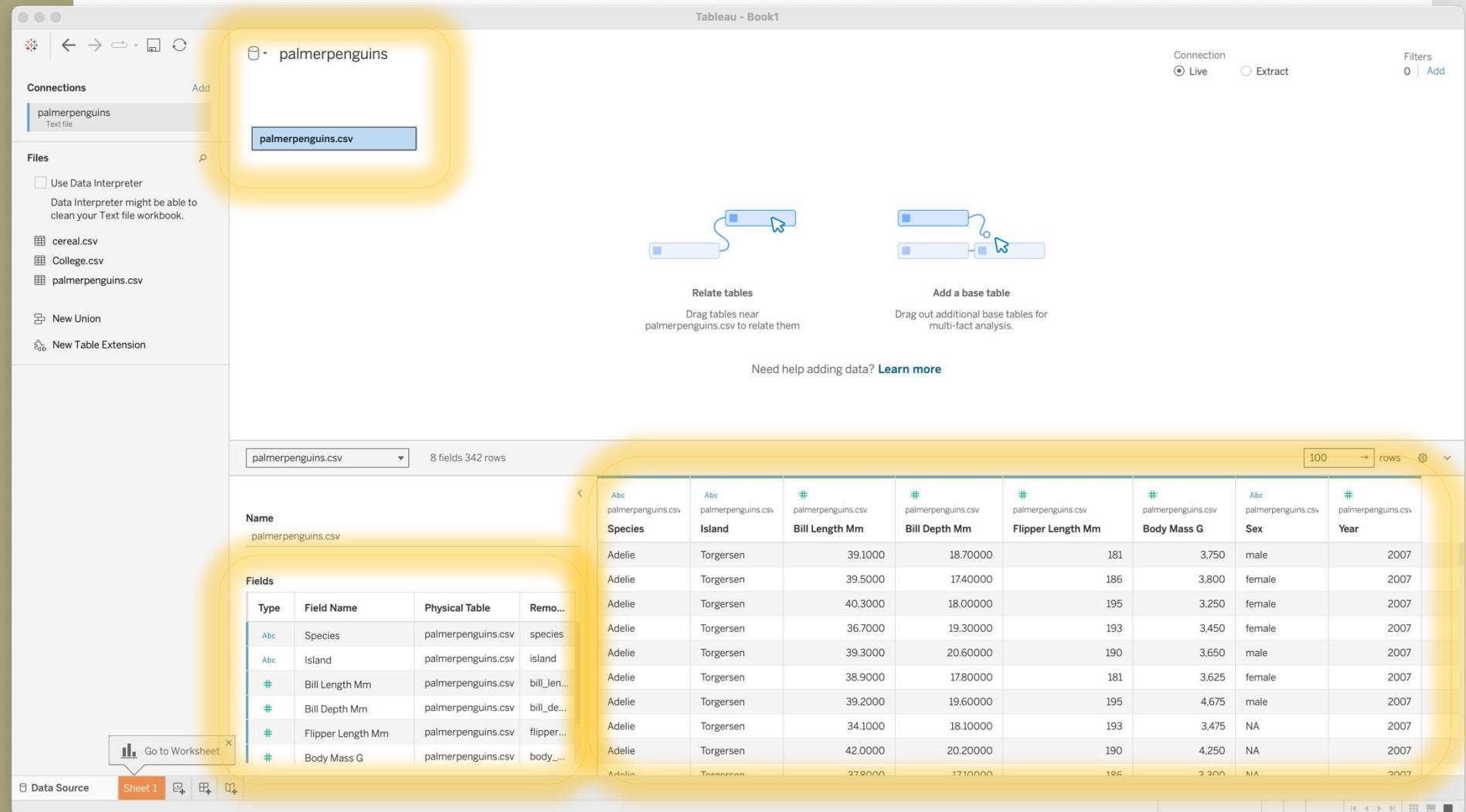
# Choose data

Tableau basics



# View data

## Tableau basics



The screenshot shows the Tableau Data Source view for a connection named "palmerpenguins". A yellow box highlights the "Connections" section where "palmerpenguins" is selected. Another yellow box highlights the "Files" section, showing "palmerpenguins.csv" which is also selected. The main area displays the data preview for "palmerpenguins.csv", which contains 8 fields and 342 rows. The columns are: Name, Species, Island, Bill Length Mm, Bill Depth Mm, Flippers Length Mm, Body Mass G, Sex, and Year. A third yellow box highlights the "Fields" section, showing the mapping of physical tables to fields: Species (palmerpenguins.csv), Island (palmerpenguins.csv), Bill Length Mm (palmerpenguins.csv), Bill Depth Mm (palmerpenguins.csv), Flippers Length Mm (palmerpenguins.csv), Body Mass G (palmerpenguins.csv), Sex (palmerpenguins.csv), and Year (palmerpenguins.csv). A fourth yellow box highlights the bottom right corner of the data preview, showing the "rows" dropdown set to 100.

Type	Field Name	Physical Table	Remo...
Abc	Species	palmerpenguins.csv	species
Abc	Island	palmerpenguins.csv	island
#	Bill Length Mm	palmerpenguins.csv	bill_len...
#	Bill Depth Mm	palmerpenguins.csv	bill_de...
#	Flippers Length Mm	palmerpenguins.csv	flipper...
#	Body Mass G	palmerpenguins.csv	body_...

# Rename Variables

Tableau basics

Tableau - Book1

Connections

- palmerpenguins (Text file)

Files

- cereal.csv
- College.csv
- palmerpenguins.csv
- New Union
- New Table Extension

Relate tables

Add a base table

Need help adding data? [Learn more](#)

palmerpenguins.csv 8 fields 342 rows

Name	Physical Table	Remote Field Name
Species	palmerpenguins.csv	species
Island	palmerpenguins.csv	island
Bill Length (mm)	palmerpenguins.csv	bill_length_mm
Bill Depth Mm	palmerpenguins.csv	bill_depth_mm
Flipper Length Mm	palmerpenguins.csv	flipper_length_mm
Body Mass G	palmerpenguins.csv	body_mass_g

Species	Island	Bill Length (mm)	Bill Depth Mm	Flipper Length Mm	Body Mass G	Sex	Year
Adelie	Torgersen	39.1000	18.70000	181	3.750	male	
Adelie	Torgersen	39.5000	174.0000	186	3.800	female	
Adelie	Torgersen	40.3000	18.00000	195	3.250	female	
Adelie	Torgersen	36.7000	19.30000	193	3.450	female	
Adelie	Torgersen	39.3000	20.60000	190	3.650	male	
Adelie	Torgersen	38.9000	17.80000	181	3.625	female	
Adelie	Torgersen	39.2000	19.60000	195	4.675	male	
Adelie	Torgersen	34.1000	18.10000	193	3.475	NA	
Adelie	Torgersen	42.0000	20.20000	190	4.250	NA	

Go to Worksheet

Data Source Sheet 1

# Worksheet

## Tableau basics

Tableau - Book1

Connections

- palmerpenguins (Text file)

Files

- cereal.csv
- College.csv
- palmerpenguins.csv

New Union

New Table Extension

palmerpenguins.csv

Relate tables

Add a base table

Need help adding data? [Learn more](#)

palmerpenguins.csv 8 fields 342 rows

Name	Type	Field Name	Physical Table	Remote Field Name
Abc	Species	palmerpenguins.csv	species	
Abc	Island	palmerpenguins.csv	island	
#	Bill Length (mm)	palmerpenguins.csv	bill_length_mm	
#	Bill Depth (mm)	palmerpenguins.csv	bill_depth_mm	
#	Flipper Length (mm)	palmerpenguins.csv	flipper_length_mm	
#	Body Mass (g)	palmerpenguins.csv	body_mass_g	

Go to Worksheet

Data Source Sheet 1

Species	Island	Bill Length (mm)	Bill Depth (mm)	Flipper Length (mm)	Body Mass (g)	Sex	Year
Adelie	Torgersen	39.1000	18.7000	181	3,750	male	
Adelie	Torgersen	39.5000	17.4000	186	3,800	female	
Adelie	Torgersen	40.3000	18.0000	195	3,250	female	
Adelie	Torgersen	36.7000	19.3000	193	3,450	female	
Adelie	Torgersen	39.3000	20.6000	190	3,650	male	
Adelie	Torgersen	38.9000	17.8000	181	3,625	female	
Adelie	Torgersen	39.2000	19.6000	195	4,675	male	
Adelie	Torgersen	34.1000	18.1000	193	3,475	NA	
Adelie	Torgersen	42.0000	20.2000	190	4,250	NA	

# New Worksheet

Tableau basics

The screenshot shows the Tableau software interface with a dark olive-green sidebar on the left containing the title "Tableau basics". The main workspace is titled "Tableau - Book1" and contains a single sheet named "Sheet 1". The interface includes a top navigation bar with standard icons, a left sidebar for "Data" and "Analytics" with a selected "palmerpenguins" data source, and a right sidebar for "Show Me" with various visualization options. The central workspace has three large, empty rectangular areas labeled "Drop field here" for dragging data fields.

Tableau - Book1

Data Analytics < palmerpenguins

Tables

- Island
- Sex
- Species
- Year
- Measure Names
- Bill Depth (mm)
- Bill Length (mm)
- Body Mass (g)
- Flipper Length (mm)
- palmerpenguins.csv (Cou...)
- Measure Values

Filters

Marks

- Automatic
- Color
- Size
- Text
- Detail
- Tooltip

Sheet 1

Drop field here

Drop field here

Drop field here

Select or drag data  
Use the Shift or Cmd key to select multiple fields

Data Source Sheet 1

# Data

## Tableau basics

The screenshot shows the Tableau software interface. On the left, a dark sidebar displays the word "Data". The main workspace is titled "Tableau - Book1" and contains a single sheet named "Sheet 1". The top navigation bar includes icons for file operations (New, Open, Save, etc.), a search bar, and a "Standard" dropdown. The left pane, titled "Data", lists the data source "palmerpenguins" and its tables: Island, Sex, Species, Year, Measure Names, Bill Depth (mm), Bill Length (mm), Body Mass (g), Flipper Length (mm), palmerpenguins.csv (Cou...), and Measure Values. Below the tables are sections for "Filters" and "Marks". The Marks section is set to "Automatic" and includes options for Color, Size, Text, Detail, and Tooltip. The central workspace has three "Drop field here" placeholder areas. A legend on the right shows various chart types like maps, bars, and lines. A note at the bottom right says "Select or drag data. Use the Shift or Cmd key to select multiple fields".

# Tableau basics

## Data Types

- All data fields are assigned one of the following types:

Icon	Description
Abc	Text values
📅	Date values
🕒	Date & Time values
#	Numerical values
T/F	Boolean values (relational only)
📍	Geographic values (used with maps)

- Occasionally the auto-detected type is wrong; this can be manually overridden using the menu

# Changing Data Types

Tableau basics

The screenshot shows the Tableau desktop interface with a context menu open over a field named "Year". The menu lists several data type options:

- Number (decimal)
- ✓ Number (whole)
- Date & Time
- Date
- String
- Boolean
- ✓ Default
- Geographic Role ►

The "Date" option is highlighted with a blue selection bar. The background shows the Tableau workspace with a single sheet titled "Sheet 1" and a sidebar with various data sources and visualization options.

# Changing Data Types

Tableau basics

The screenshot shows the Tableau desktop interface with a context menu open over a field in the data pane. The menu is titled "Add to Sheet" and includes options like "Duplicate", "Rename", "Hide", "Create", "Transform", "Convert to Discrete", "Change Data Type", "Default Properties", "Group by", "Folders", "Hierarchy", "Replace References...", and "Describe...". The "Change Data Type" option is selected and highlighted in blue. A secondary menu for "Number (decimal)" is displayed, listing other data types: "Number (whole)", "Date & Time", "✓ Date", "String", "Boolean", and "Default". The main workspace shows a blank sheet titled "Sheet 1" with a placeholder "Drop field here". The top navigation bar includes tabs for "Data" and "Analytics", and various toolbars for data selection and visualization.

# Adding Measures

## Tableau basics

The screenshot shows the Tableau desktop interface with a dark olive-green sidebar on the left. The main workspace is titled "Tableau - Book1". In the top-left corner of the workspace, there is a context menu for a selected measure named "Bill Depth (mm)". The menu has the following options:

- Add to Sheet
- Duplicate
- Rename
- Hide
- Create ▶
- Transform ▶
- Convert to Discrete
- Convert to Dimension
- Change Data Type ▶
- Default Properties ▶
- Geographic Role ▶
- Group by ▶
- Folders ▶
- Replace References...
- Final...

The "Create" option is highlighted with a blue background. A secondary context menu is open under the "Create" option, containing the following items:

- Calculated Field...
- Group...
- Bins...
- Parameter...

The "Calculated Field..." item is also highlighted with a blue background. The rest of the workspace shows the standard Tableau interface with a data source named "palmerpenguins", a sheet titled "Sheet 1", and various visualization tools and filters.

# Adding Measures

Tableau basics

Tableau - Book1

Data Analytics < Pages Columns Rows Standard

palmerpenguins

Search

Tables

- Island
- Sex
- Species
- Year
- Measure Names
- Bill Depth (mm)
- Bill Length (mm)
- Body Mass (g)
- Flipper Length (mm)
- palmerpenguins.csv (Count)
- Measure Values

Marks

Automatic

Color Size Text Detail Tooltip

Sheet 1 Drop field here

Drop field here

Bill Depth:Length [Bill Depth (mm)]/[Bill Length (mm)]

The calculation is valid.

Apply OK

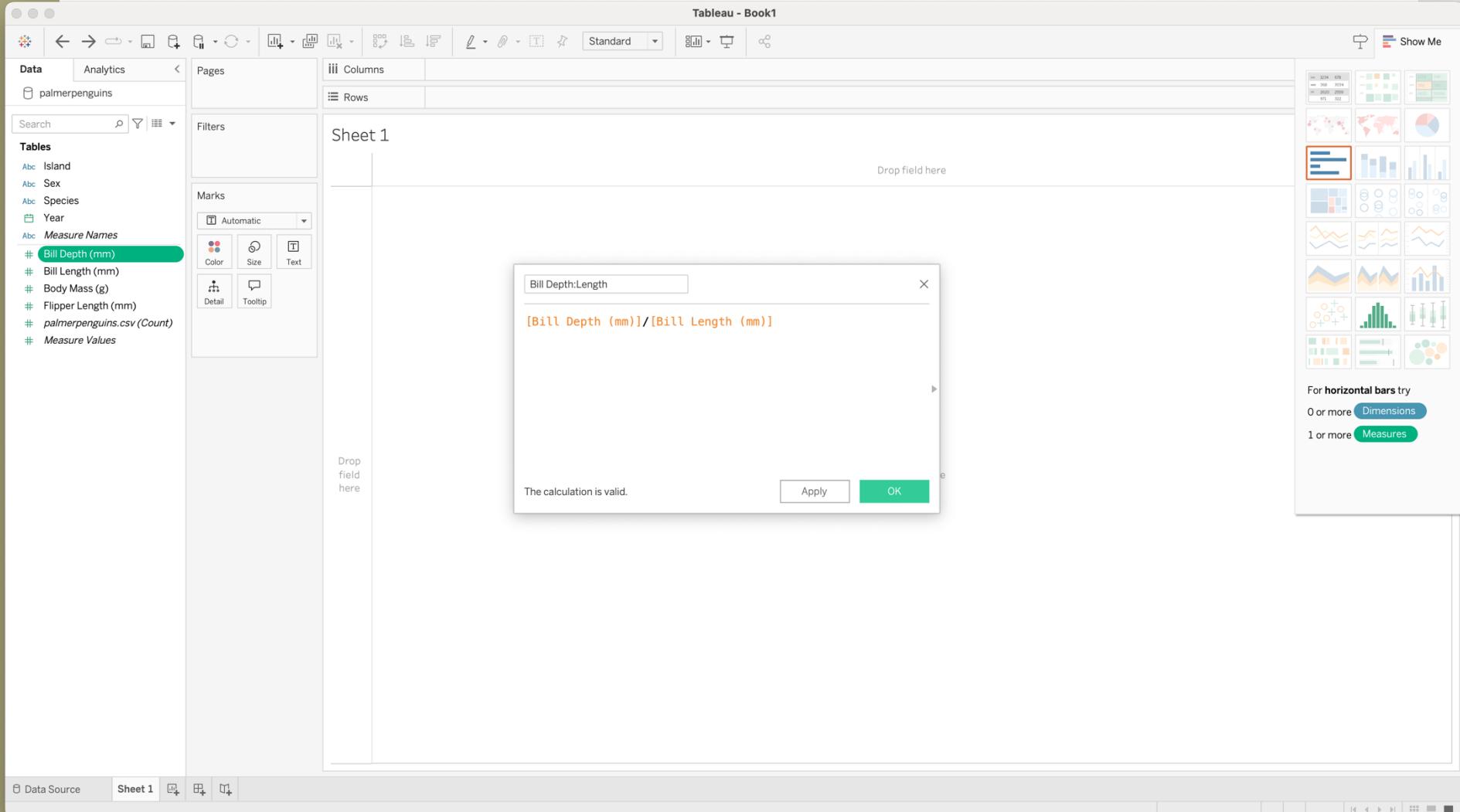
Show Me

For horizontal bars try

0 or more Dimensions

1 or more Measures

Data Source Sheet 1



# Adding Measures

Tableau basics

Tableau - Book1

The screenshot shows the Tableau desktop interface with the following details:

- Data Pane:** Shows the "palmerpenguins" data source. Under "Tables", "Measure Names" is expanded, and "Bill Depth.Length" is highlighted with a green border.
- Marks Shelf:** Set to "Automatic". Buttons for "Color", "Size", and "Text" are visible. Below them are buttons for "Detail" and "Tooltip".
- Sheet 1:** A blank canvas with a placeholder text "Drop field here".
- Right Panel:** Shows the "Show Me" panel with various visualization options. A blue box highlights the horizontal bar chart icon.
- Bottom Navigation:** Includes buttons for "Data Source", "Sheet 1", and zoom controls.

A callout box with a yellow background and a black border is overlaid on the interface, containing the following text:

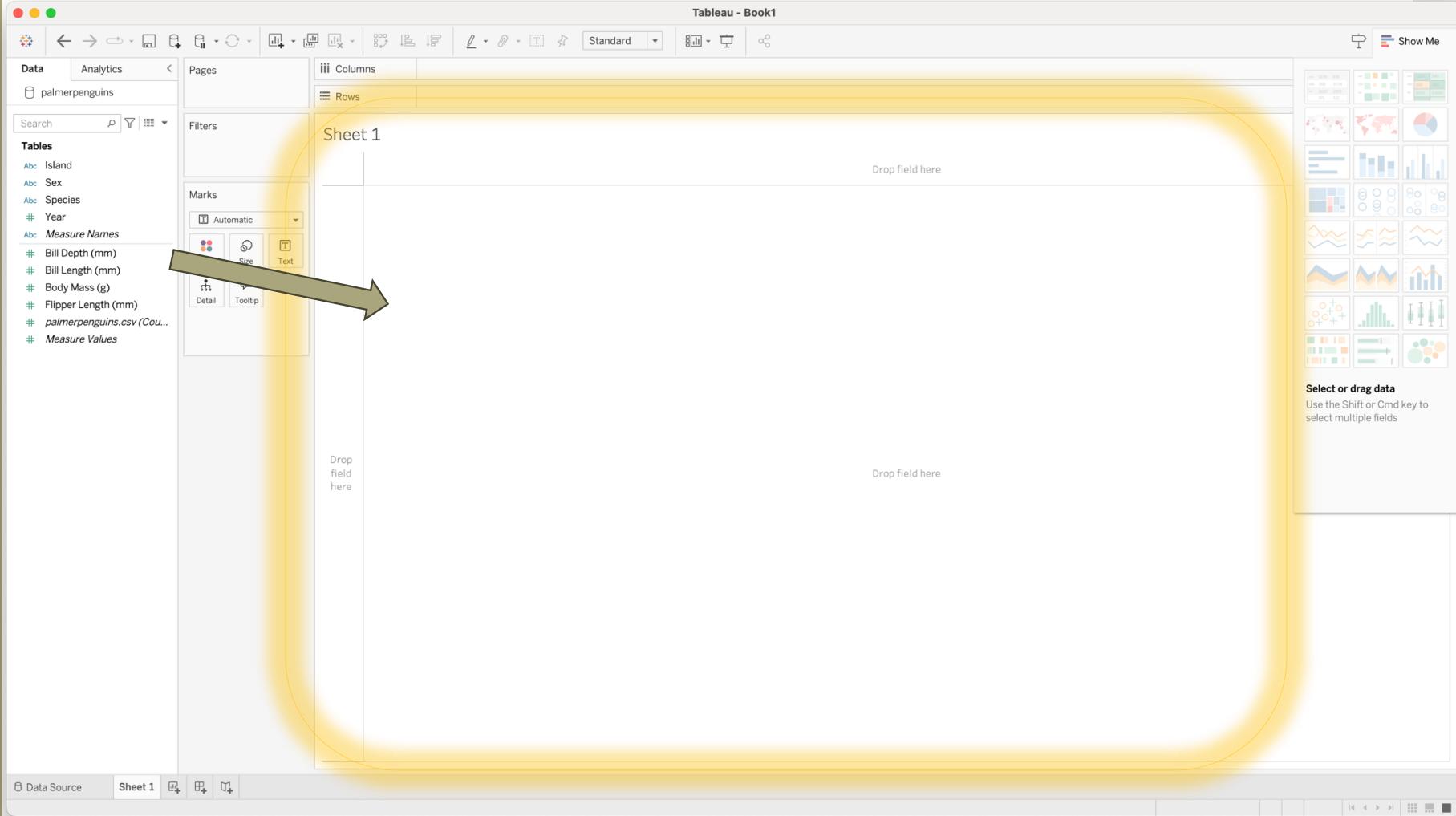
Try Groups and Bins as well!

Calculated Field...  
Group...  
Bins...  
Parameter...

For horizontal bars try  
0 or more Dimensions  
1 or more Measures

# Visualizing Data

## Tableau basics



# Visualizing Data

## Tableau basics

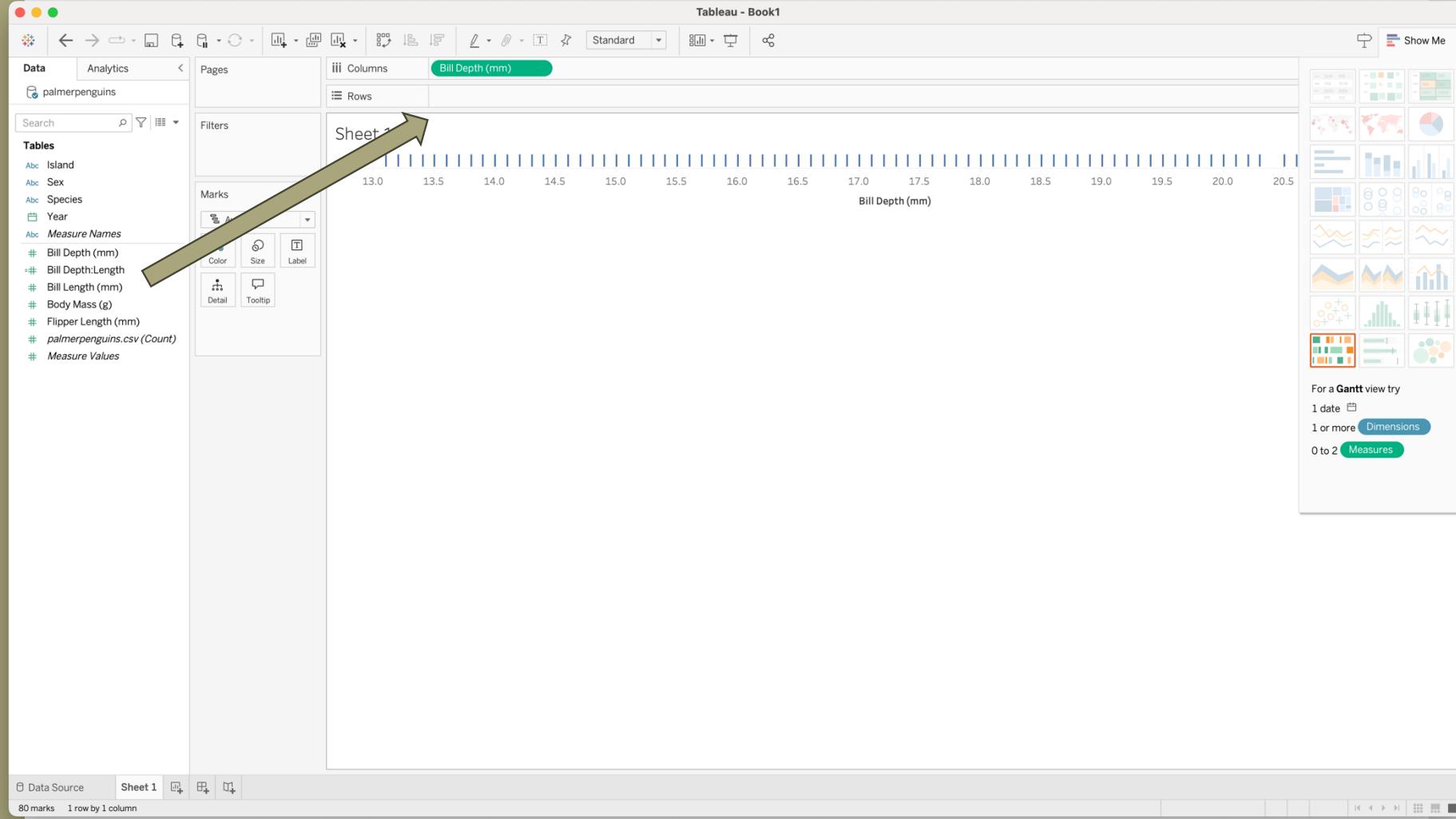
The screenshot shows the Tableau interface with a context menu open over a measure named "SUM(Bill Depth (mm))". The menu items are:

- Filter...
- Show Filter
- Format...
- Show Header
- Include in Tooltip
- Dimension** (highlighted in blue)
- Attribute
- Measure (Sum) ►
- Discrete
- Continuous
- Edit in Shelf
- Add Table Calculation...
- Quick Table Calculation ►
- Remove

The Tableau interface includes a sidebar with tables like Island, Sex, Species, Year, and various measures. The bottom status bar indicates "1 mark 1 row by 1 column SUM(Bill Depth (mm)): 5,866".

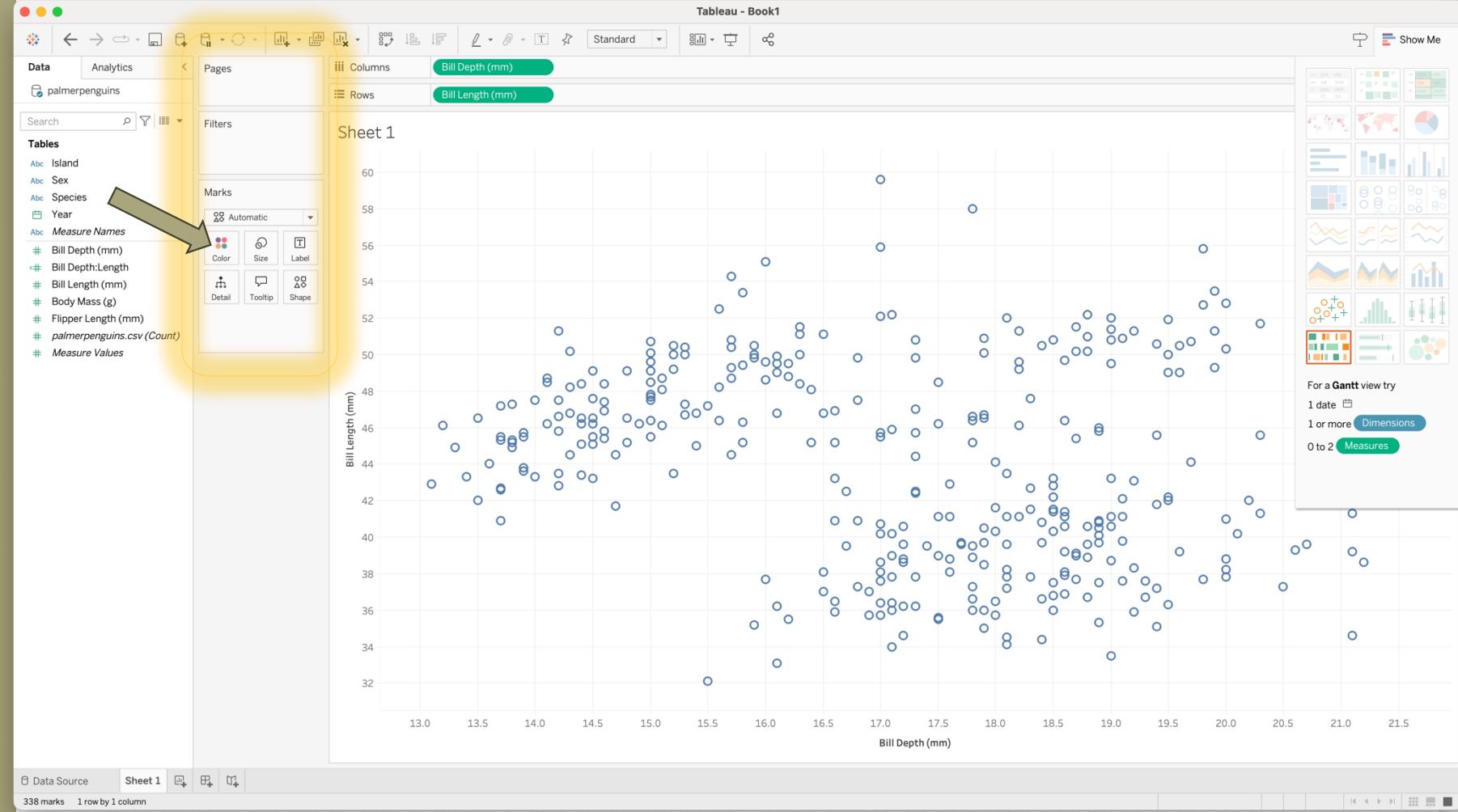
# Visualizing Data

## Tableau basics



# Visualizing Data

Tableau basics



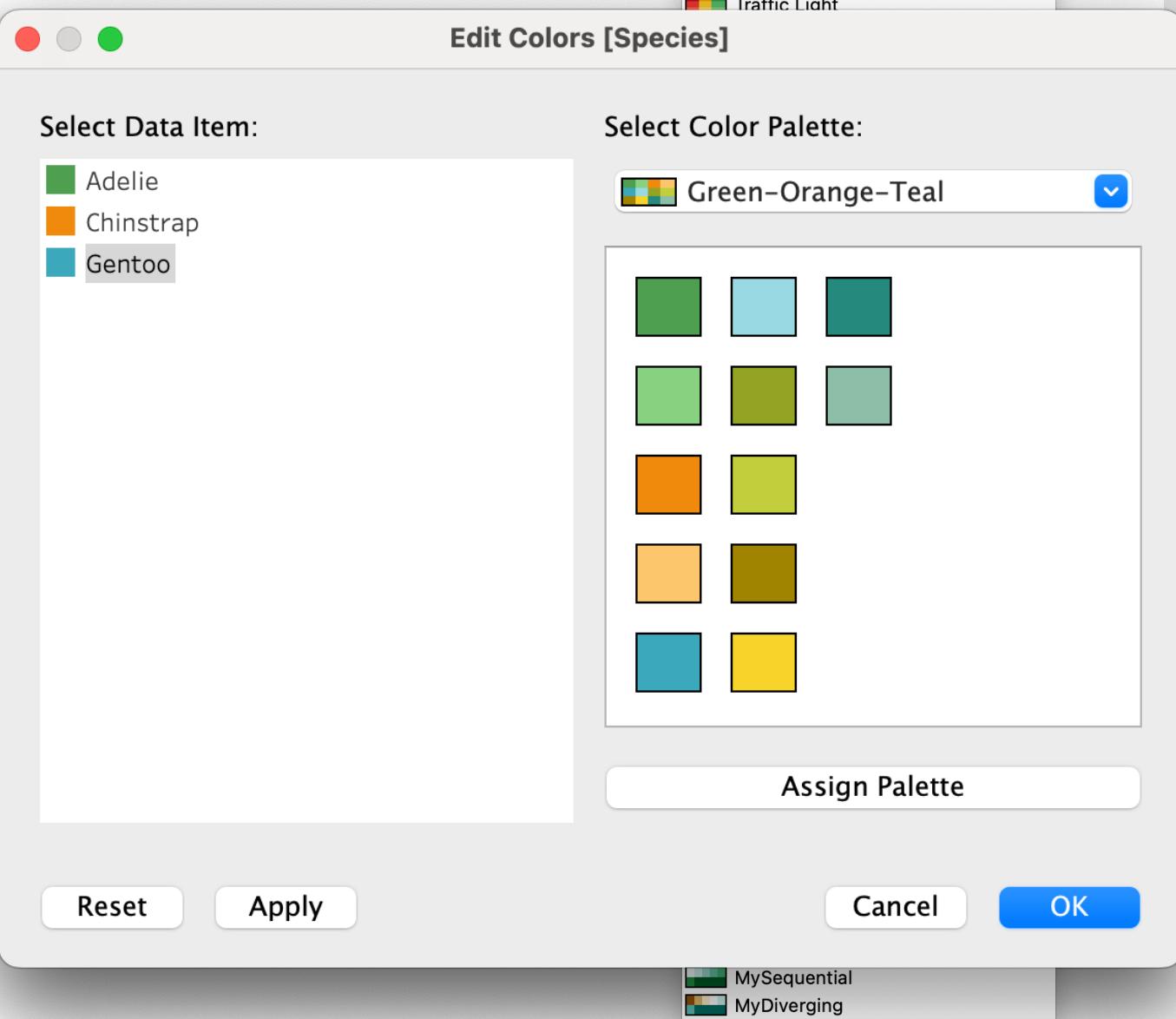
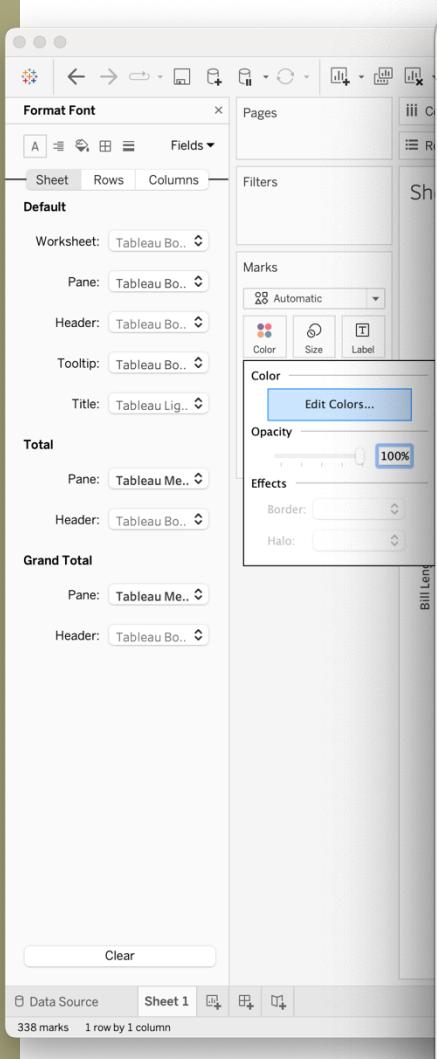
# Visualizing Data

Tableau basics



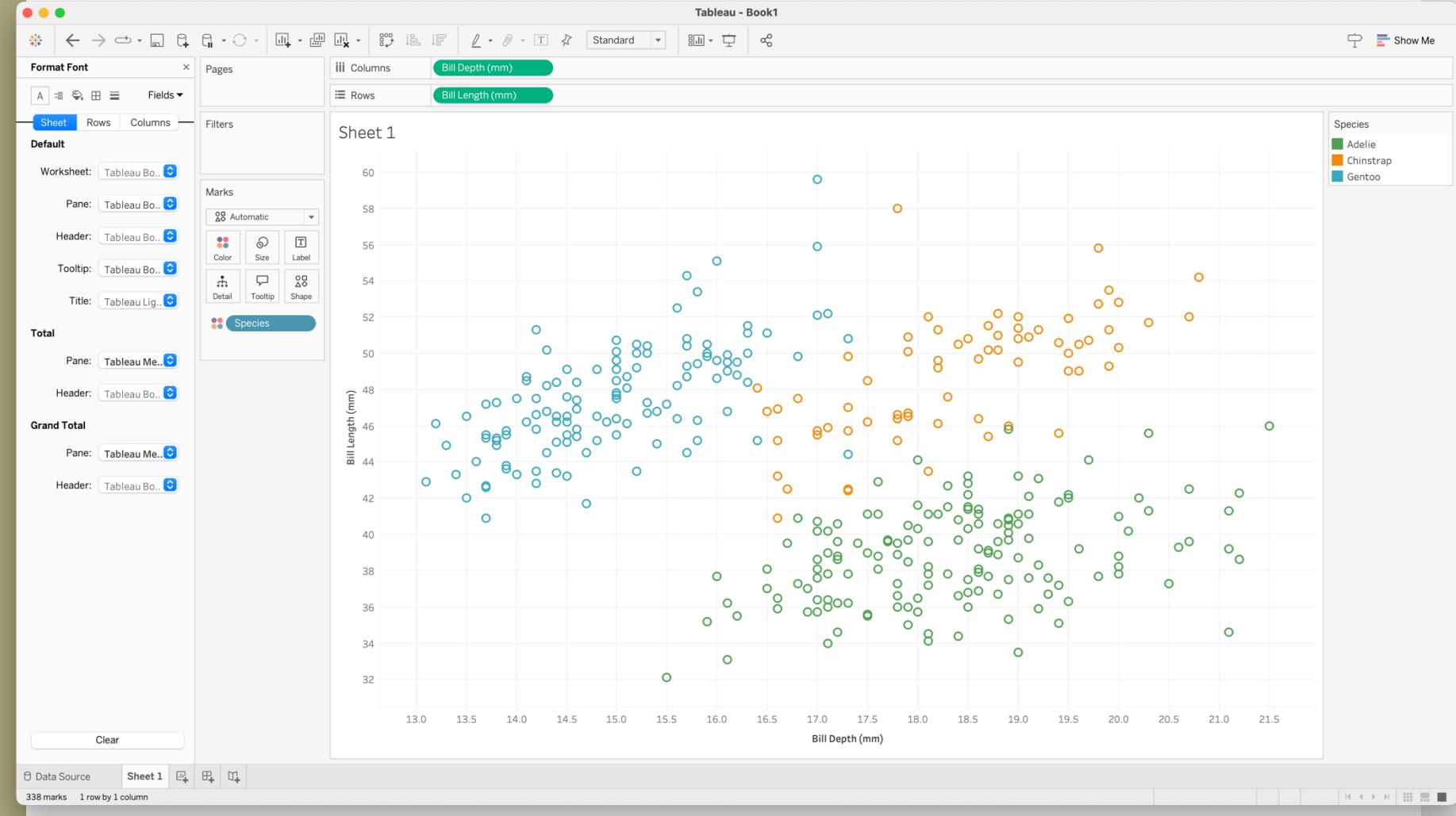
# Visualizing Data

Tableau basics



# Visualizing Data

Tableau basics



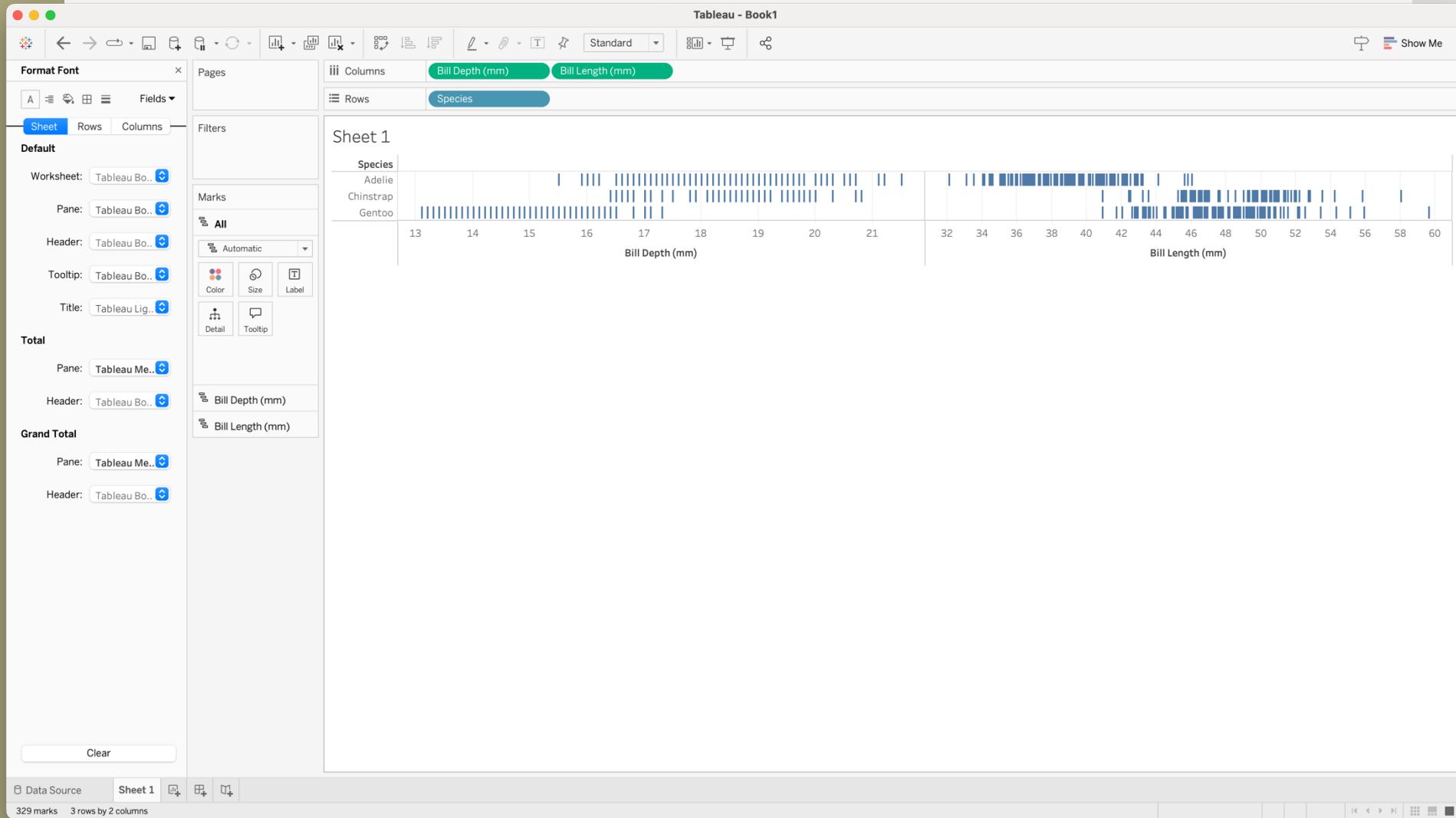
# Show Me

Tableau basics



# Show Me (not all options are good ideas!)

## Tableau basics



# Tableau basics

## 21 Available Views



- Tables
- Maps
- Pie charts
- Bar charts
- Treemaps
- Circle views
- Line charts
- Area charts
- Combination charts
- Scatterplots
- Histograms
- Box-and-whisker plots
- Gantt
- Bullet plots
- Packed circles

# Dual Encoding

Tableau basics



# Title

## Tableau basics

Tableau - Book1

Sheet 1

Bill Depth (mm)

Bill Length (mm)

Species

Adelie

Chinstrap

Gentoo

Emperor

Adelie

Chinstrap

Gentoo

Emperor

Bill Length vs. Depth

Tableau Light 15 B I U Insert X

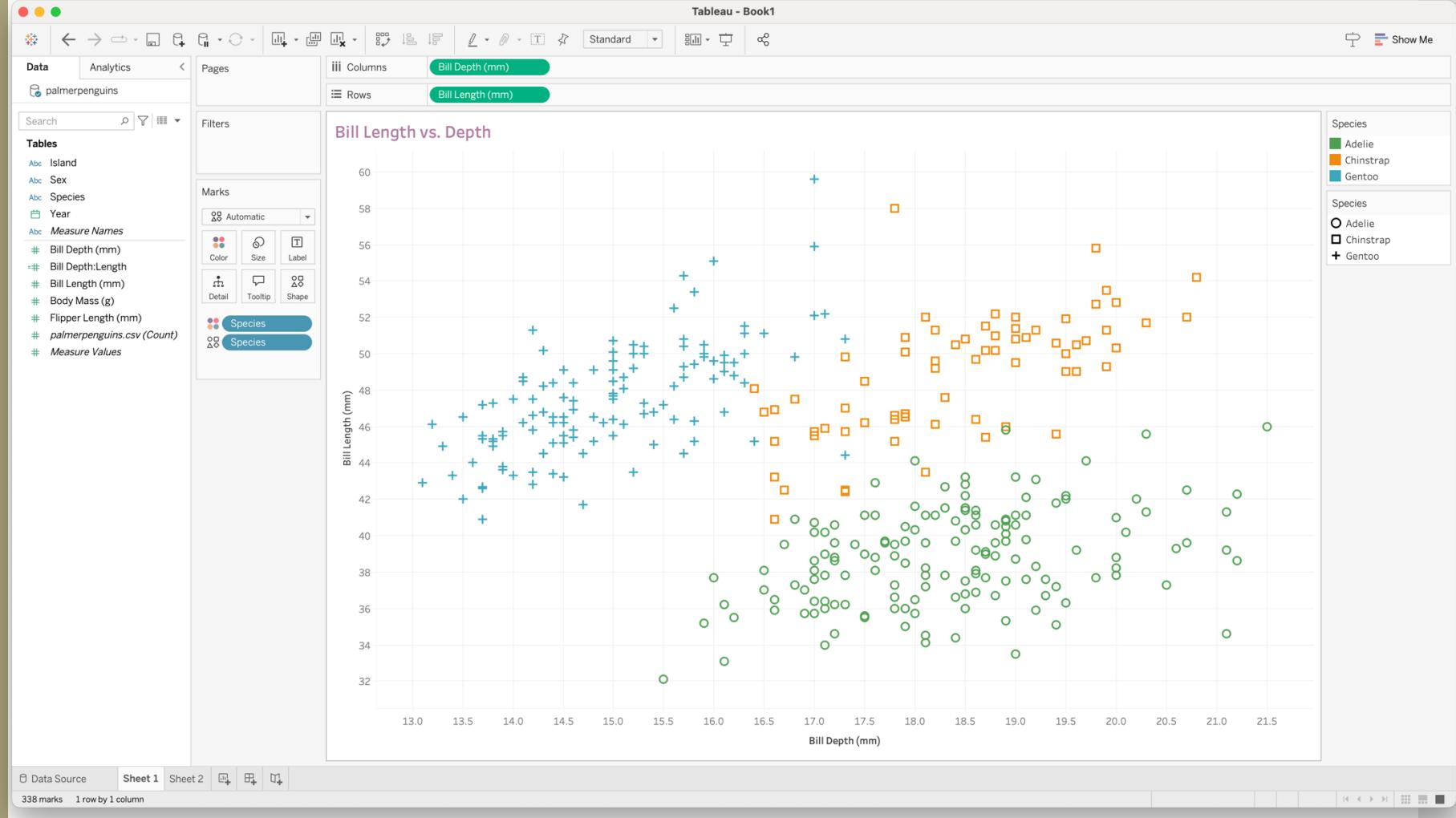
Reset Apply Cancel OK

338 marks 1 row by 1 column

The screenshot shows the Tableau interface with a title edit dialog open. The main workspace displays a visualization with 'Bill Depth (mm)' in the columns shelf and 'Bill Length (mm)' in the rows shelf. A 'Filters' pane is visible on the right. The title edit dialog has a yellow background and contains the text 'Edit Title'. It features a toolbar with font style (Tableau Light), size (15), bold (B), italic (I), underline (U), and color (purple). Below the toolbar is the title 'Bill Length vs. Depth'. At the bottom of the dialog are buttons for 'Reset', 'Apply', 'Cancel', and 'OK'.

# Title

## Tableau basics



# Creating a new sheet

The screenshot shows the Tableau desktop interface with a dark olive-green sidebar on the left containing the text "Tableau basics". The main workspace is titled "Tableau - Book1". A data source named "palmerpenguins" is connected. The left pane displays a list of fields under "Tables" and "Measure Names". The right pane shows a blank sheet titled "Sheet 2" with three placeholder text boxes labeled "Drop field here". The top menu bar includes options like "Data", "Analytics", "Pages", "Columns", "Rows", and "Standard". The bottom navigation bar includes tabs for "Data Source", "Sheet 1", and "Sheet 2".

# Show Me

## Tableau basics

The screenshot shows the Tableau software interface with the title "Tableau - Book1". The left sidebar displays the "Data" and "Analytics" tabs, with "palmerpenguins" selected under "Data". The "Tables" section lists fields such as Island, Sex, Species, Year, Measure Names, Bill Depth (mm), Bill Depth:Length, Bill Length (mm), Body Mass (g), Flipper Length (mm), palmerpenguins.csv (Count), and Measure Values. The "Marks" section shows options for Automatic, Color, Size, Text, Detail, and Tooltip. The main workspace is titled "Sheet 2" and contains three blank white rectangles with "Drop field here" placeholder text. A yellow callout box highlights the "Show Me" feature in the top right corner of the interface.

For horizontal bars try

0 or more Dimensions  
1 or more Measures

# Show Me

## Tableau basics

The screenshot shows the Tableau interface with the title "Tableau - Book1". On the left, the data source "palmerpenguins" is selected. The "Measures" section of the data pane is highlighted with a yellow box, showing fields like "Bill Depth (mm)", "Bill Depth:Length", "Bill Length (mm)", "Body Mass (g)", "Flipper Length (mm)", and "palmerpenguins.csv (Count)". A specific field, "Bill Depth (mm)", is selected and highlighted with a green box. The "Marks" card indicates "Automatic" and includes options for Color, Size, Text, Detail, and Tooltip. The main workspace, "Sheet 2", contains three "Drop field here" placeholder boxes. A large yellow box highlights the "Show Me" feature on the right side of the screen, which displays a grid of various chart types such as bar charts, line graphs, and maps. Below the grid, text reads: "For horizontal bars try 0 or more Dimensions 1 or more Measures".

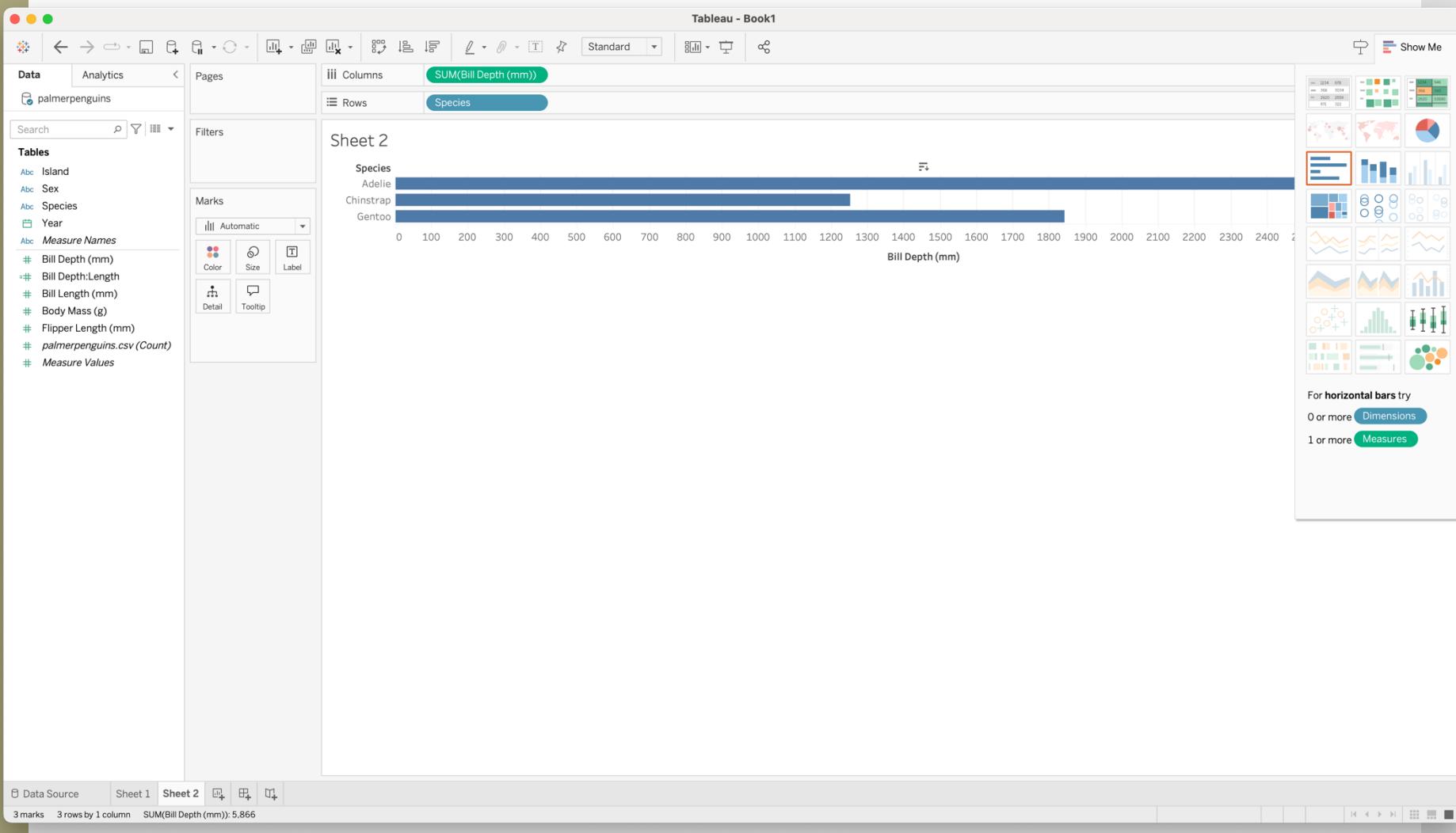
# Show Me

## Tableau basics

The screenshot shows the Tableau software interface with the title "Tableau - Book1". On the left, the "Data" pane displays a connection to "palmerpenguins" with a search bar and a list of fields: Island, Sex, Species (highlighted in blue), Year, Measure Names, Bill Depth (mm) (highlighted in green), Bill Depth:Length, Bill Length (mm), Body Mass (g), Flipper Length (mm), palmerpenguins.csv (Count), and Measure Values. The "Marks" pane shows options for Automatic, Color, Size, Text, Detail, and Tooltip. The main area, "Sheet 2", has three "Drop field here" placeholder boxes. A large yellow callout box highlights the "Show Me" feature on the right, which is a palette of various chart types including horizontal bars, pie charts, and scatter plots. Below the palette, text reads: "For horizontal bars try 0 or more Dimensions 1 or more Measures".

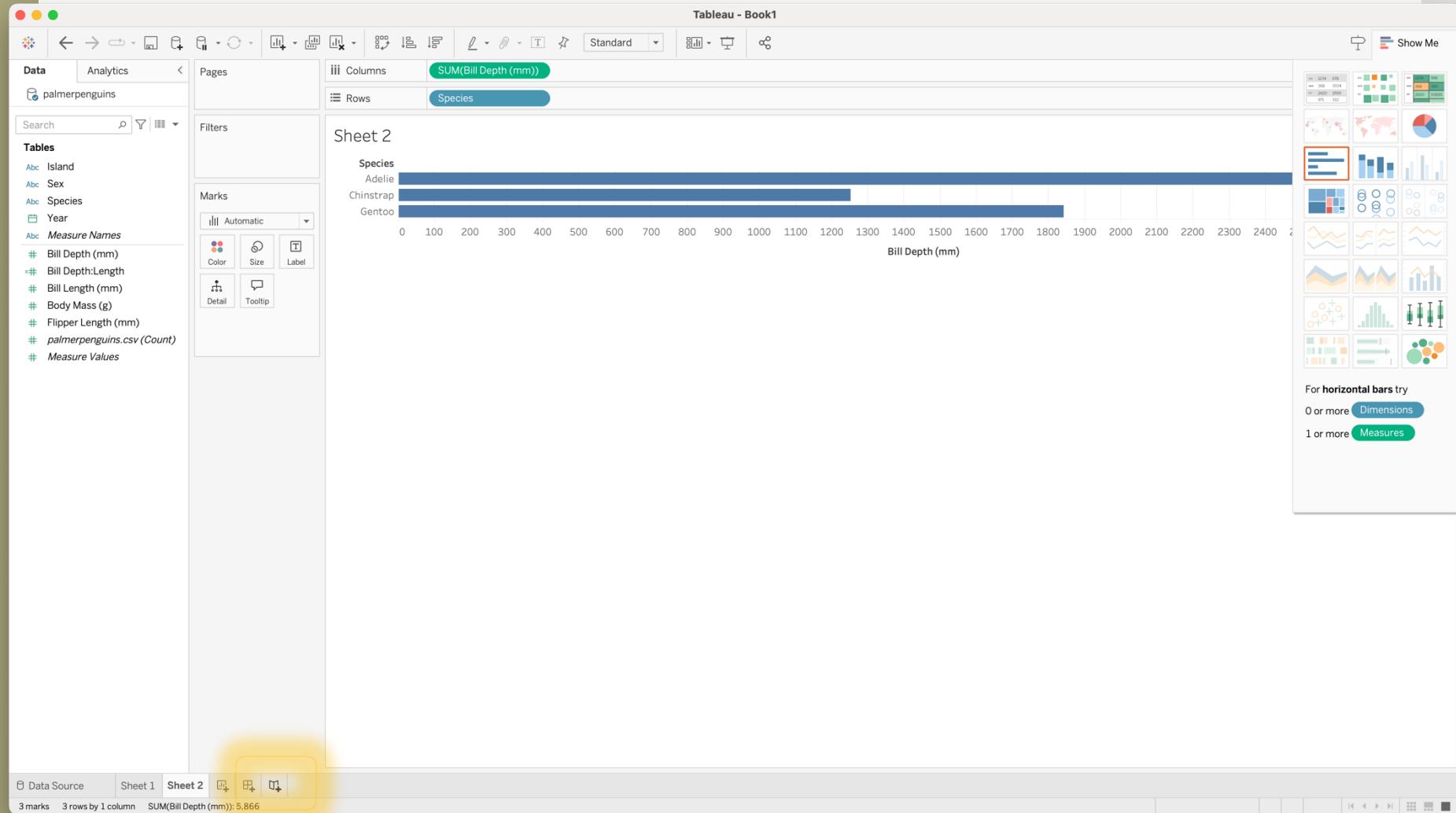
# Show Me

## Tableau basics



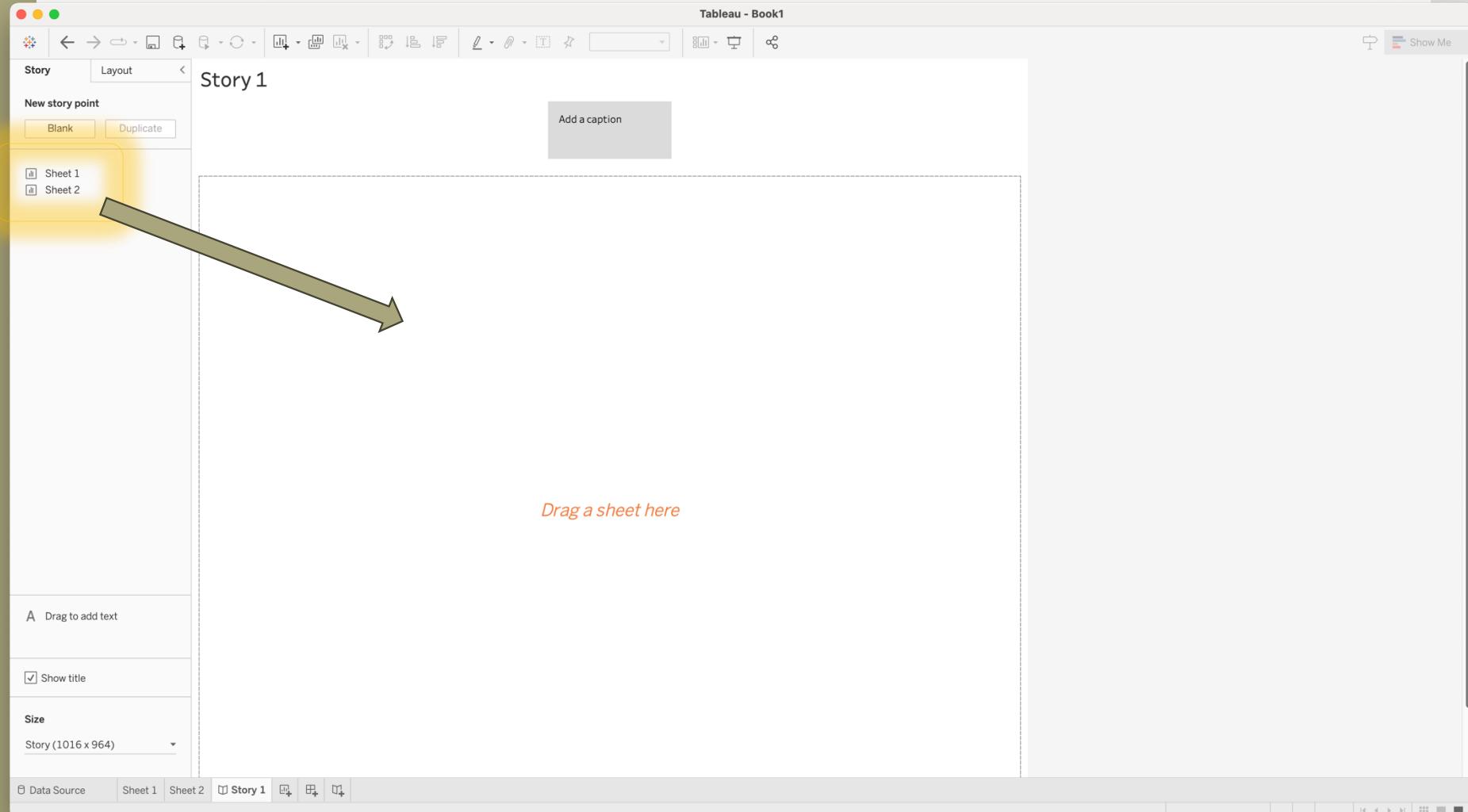
# Building Stories from Multiple Views

Tableau basics



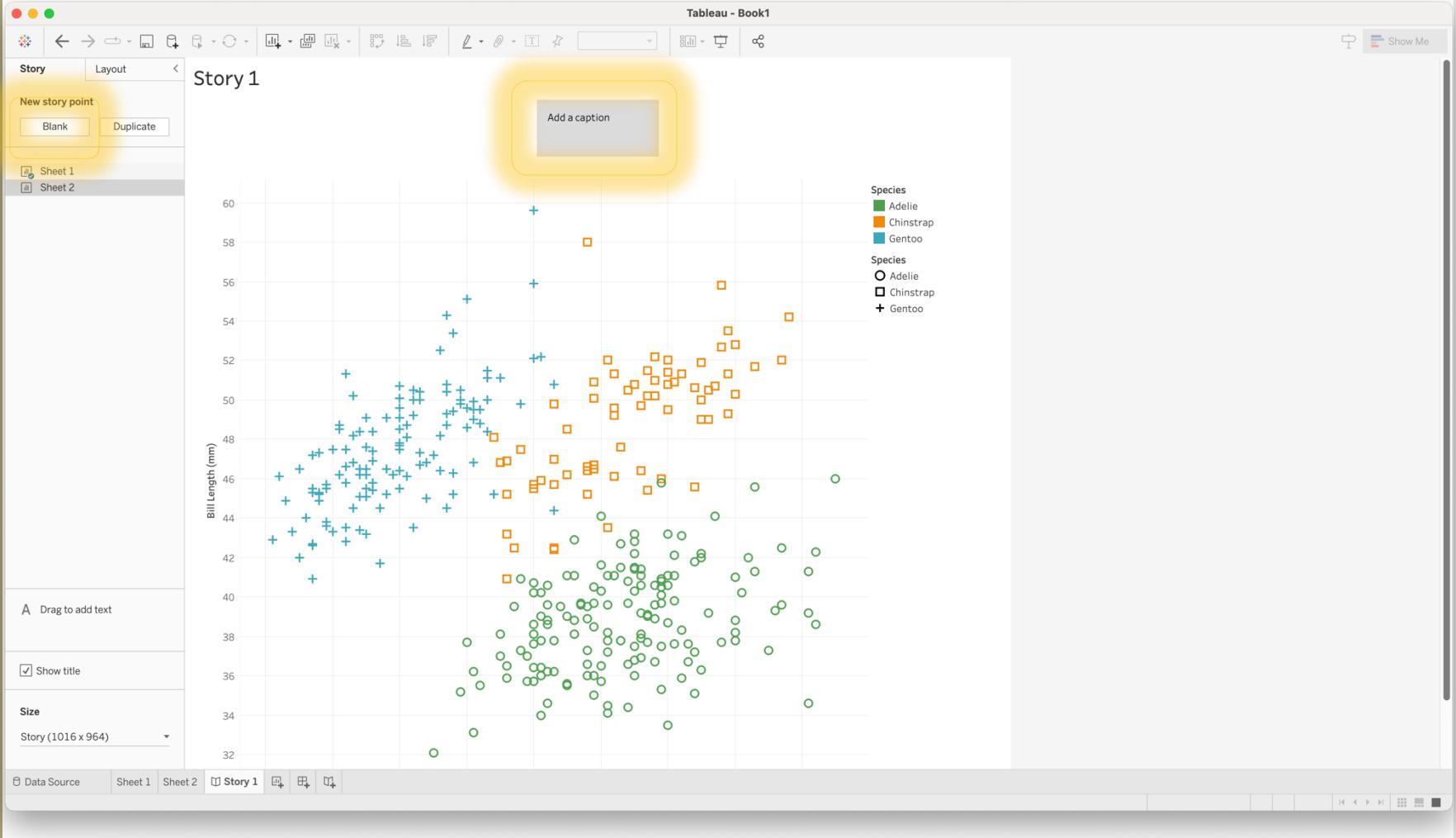
# Building Stories from Multiple Views

Tableau basics



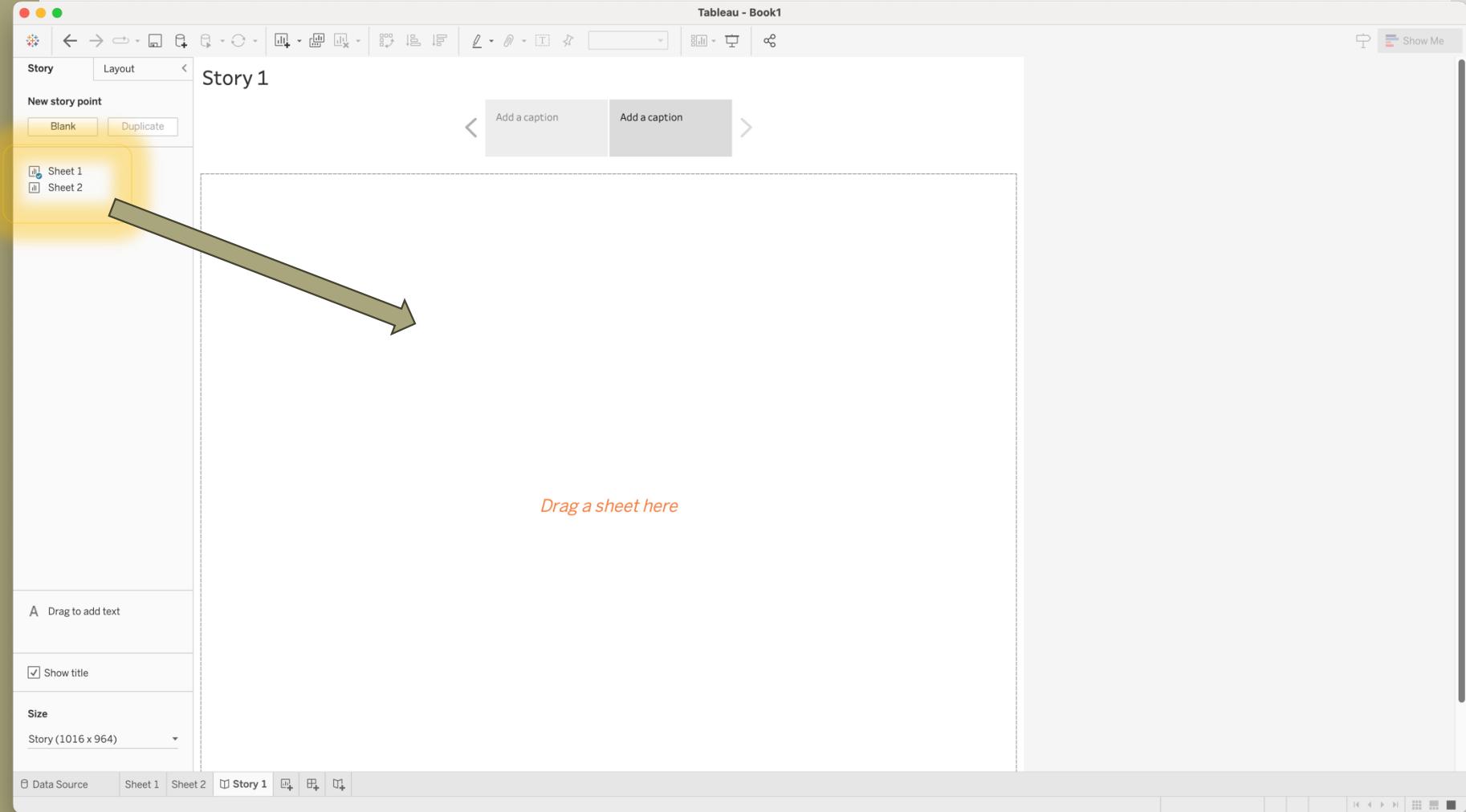
# Building Stories from Multiple Views

Tableau basics

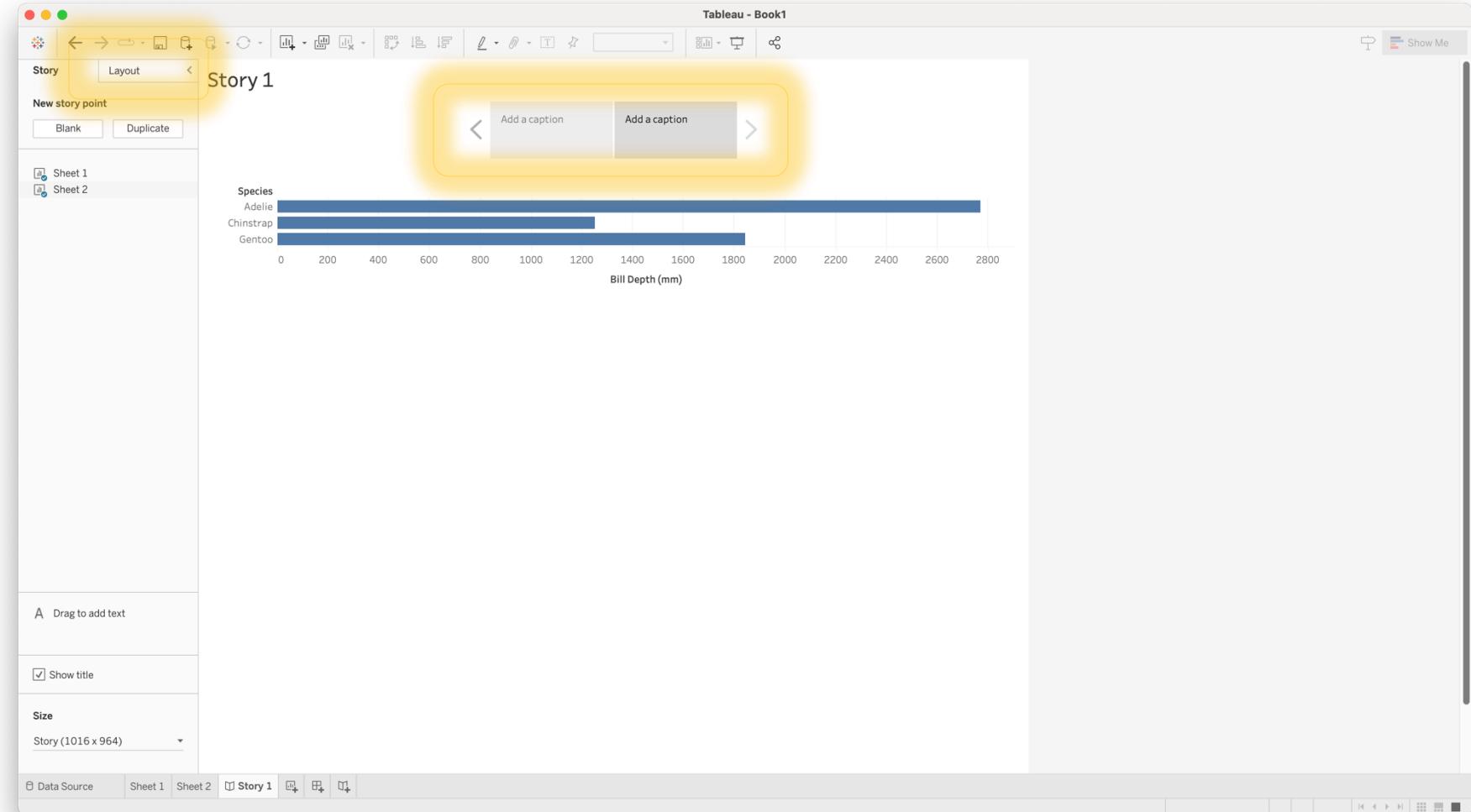


# Building Stories from Multiple Views

Tableau basics



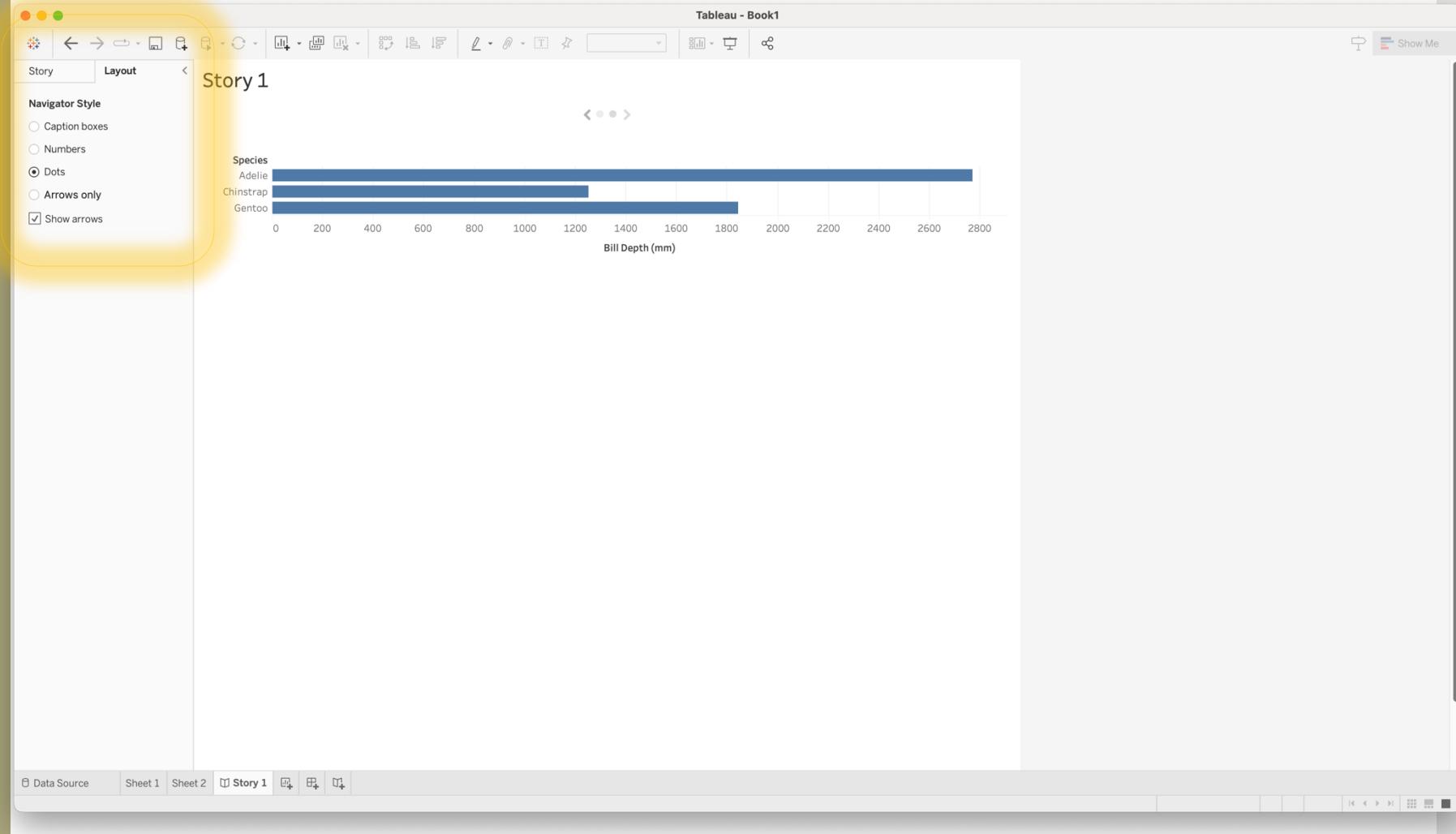
# Building Stories from Multiple Views



## Tableau basics

# Building Stories from Multiple Views

Tableau basics



# Tableau basics

For an intro to:

- Custom axes
- Custom color pallets
- Custom shapes

see `tableau-demo-int.pdf` under In-class on the course website.

## Your turn!

- Form groups of 2
- Choose a dataset of interest to you from this list:  
[goo.gl/kcbqfc](http://goo.gl/kcbqfc)
- Create a visualizations in Tableau
  - I recommend trying out some customizations!
- Pair up with another group
- Let the other group view your visualization *without any explanation from you*
- Provide feedback to each other
  - What are two specific things you saw that you liked?
  - What are two specific things you would have done differently?

## Discussion

- What are some of Tableau's strengths? Weaknesses?
- What are your initial thoughts after using it?

Tableau basics