

# A Quarto Template Repo to Create Big Reports and Very Long Title Because Long Titles are Common

*Some tips on creating reports with Quarto with a focus on tables and replicated tables and figures*

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The Publisher *PL*

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# Citation

EE Holmes, 2022. Quarto Report Template. Northwest Fisheries Science Center.

# 1. Preface

## Acknowledgements

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## Abstract

Phasellus non diam posuere, laoreet velit sed, egestas felis. Etiam eget neque in tellus lacinia tincidunt. Pellentesque scelerisque odio velit, nec fringilla nibh iaculis non. Aenean sit amet nulla ipsum. Cras felis lacus, pulvinar ac nisi et, convallis pulvinar turpis. Morbi non nibh lacus. Morbi vitae lorem massa. Sed ut turpis vel felis posuere commodo lacinia ac mi. Donec finibus lectus sit amet elit finibus, vitae rhoncus ligula tincidunt. Phasellus vitae blandit lacus. Integer sed nisl fermentum, pulvinar mauris in, posuere enim. Proin sit amet semper urna. Vivamus aliquet rutrum diam ac luctus.

## 2. Tips

### 2.1. Overview

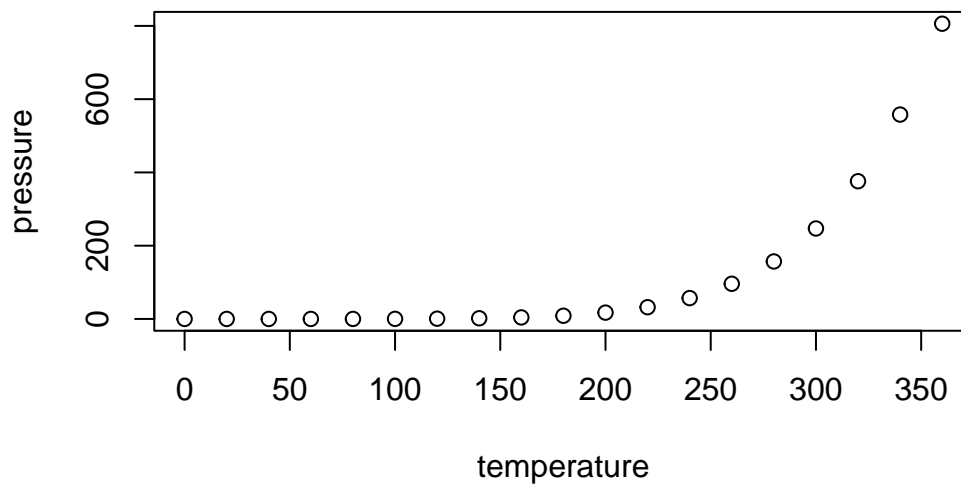


Figure 2.1.: chapter 1 plot

### 2.2. General set-up

- Be as modular and simple as you can.
- Don't make everyone in your team be the markdown wizard. You only need one person to build the framework.
- Use simple child Rmds so that other team members work only on simple Rmd/qmd flat files.



## 2. Tips

- Don't put all your tables or figures in one huge file: `Table xyz.Rmd/qmd`, `Table abc.Rmd/qmd`. Have your dedicated markdown wizard figure out the automatic numbering.
- Copy reports built by others who are doing something similar to you. TALK within your center or across centers and share work.

## 2.3. Tips

### 2.3.1. Cross-references

This can be really troublesome unless you use an output that already has cross-references as part of the design. For R Markdown,

- `{bookdown}` outputs for html and PDF
- `{officetdown}` for Word

These output formats give you access to cross-referencing via the `\@ref(xxx:yyy)` format and if you use `bookdown::pdf_book`, this will also work with PDF.

However, Quarto makes cross-references, auto-numbering and cross-referencing of tables and figures super easy. Quarto cross-ref page.

For example, we can make a figure with the chunk label `fig-plot` like so.

```
```{r}
#| label: fig-plot
#| fig-cap: "Plot"

plot(cars)
```
```

The later in the text we use `@fig-plot` to get Figure 2.2.

### 2.3.2. Chunk labels

- When using R Markdown (or Quarto), it is best not to use chunk labels in the your Rmd/qmd children. It's too easy to get duplicate labels accidentally.

## 2. Tips

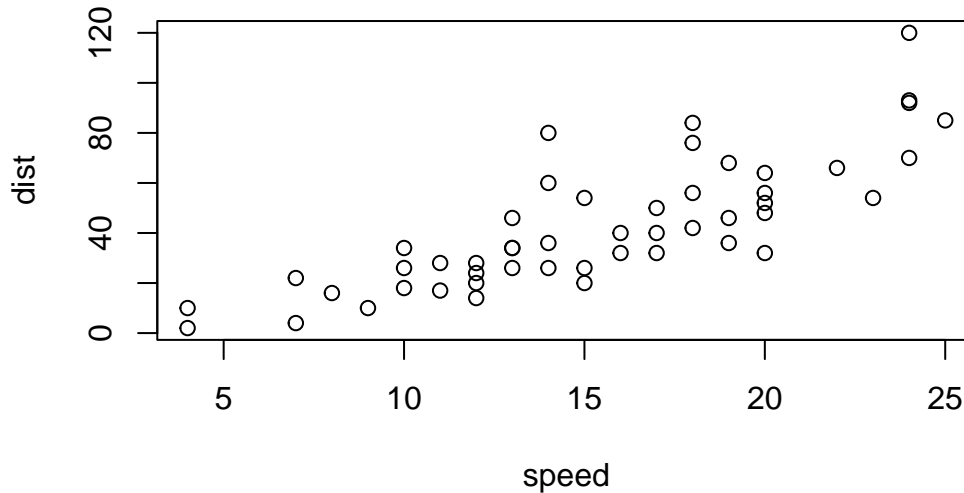


Figure 2.2.: This is a plot of some data

### 2.3.3. File paths

- if you need to reference a file in a folder, let R create the path so that it is compatible across systems:

```
file.path('figures', 'figure1.Rmd')
```

- I typically use the {here} package so that my code doesn't break if I happen to issue a change workspace directory command.

```
here::here('images', 'logo.png')
```

### 2.3.4. Tables in for loops

Making tables within `for` loops is tricky and it is different if you are outputting to Word versus html and also depends on what package that you use. See my Rmd/qmd files in the tables folder for examples of how to set it up, but also be prepared for things breaking in the future as package writers change things. This feature is really fluid. Web searches on stackoverflow are key for solving these problems.

## 2. Tips

### 2.4. Working with Word

For many of us, Word is part of our team's workflow. Here are some tips if that is the case for you:

- Check out the officeverse: `officedown` and `flextable` R packages.
- Quarto has greatly improved Word integration so many of the problems we faced with Word output may soon be solved.
- Don't build the whole report in one file. Work on individual text sections and then have RStudio (via `pandoc/knitr`) assemble the report (text, figures, tables) from the individual parts.
- How to deal with the team needing to review the assembled document (text, figures, tables):
  - Try to modularize. So maybe make individual chapters and have review happen at that level. Then you incorporate the changes into the plain text manually.
  - Use templates to make your Word doc look the way you want. The default Word template is bare bones. See my example and read about using Word templates with Quarto [here](#) and R Markdown [here](#) .

#### 2.4.1. Making tables look nice in Word

The example in `Table_Counts.Rmd` and `Table_Counts_flex.Rmd` shows you tricks to make nice Word tables.

- how to include a page break in your Word doc between tables.
- using `format="pandoc"` for the table
- using `results='asis'` and `print()` so you can use `for` loops.
- centering your tables is next to impossible with `kable()`. Use the `{flextable}` package if you need that.

#### 2.4.2. New pages

This is how to get a new page in Word. Make sure you are in print view on the word doc, otherwise you won't see any of the pages.

```
“““{=openxml}
<w:p><w:r><w:br w:type="page"/></w:r></w:p>
“““
```

## 2.5. Output templates with Quarto

Quarto is working on templates to make output to different formats easy. Here is an example of journal templates quarto-journals.

## 2.6. Weird Quarto quirks

- If you use

```
---  
title: MyTitle  
---
```

as your title spec, then you won't get the first header 2 in your pdf. Use # instead.

- If you have 2 # levels in a qmd file, you only the first chapter appearing in the TOC. The others appear weirdly as sub-chapters.
- with flextable, your table captions from knitr yaml disappear if the table breaks across a page.

## 3. Tables intro

This chapter shows a few simple examples of including tables and getting cross-referencing to work across formats (HTML, Word, PDF). See Chapter 5 for more examples and comparisons of different table outputs.

In this chapter, I am going to use `{flextable}` for Word and HTML and `{kableExtra}` for PDF. See Chapter 5 for a comparison of `{flextable}`, `{kableExtra}` and `{gt}`. There is a current problem that Quarto is not processing the cross-references with `{flextable}` into PDF and Word. But this is a known problem and they are working on it. `{flextable}` is the only table package that I have found the tends to work as expected across platforms. The `{officer}` package uses it so it works well with Word and works well with LaTeX.

\*Note, I am using some customized functions to be able have a uniform look for my tables. These are in `tables/_common.R`.

### 3.1. Example table

This is an example a table. We can reference Table 3.1 (note this is broken in Word output) easily and it is auto-numbered.

### 3.2. Including table files

It is often good to have your files in separate files so that when you edit your tables, you only have to work on the table code.

```
```{r child=here::here("tables", "Table_flex.Rmd")}
```
```

Table 3.2.: This table is created in `Table_flex.Rmd`. `flextable`.

|           | Df | Deviance | Resid. Df | Resid. Dev |
|-----------|----|----------|-----------|------------|
| NULL      |    |          | 99        | 129.5      |
| ethnicity | 3  | 47.2     | 96        | 82.2       |

### 3. Tables intro

Table 3.2.: This table is created in `Table_flex.Rmd`. flextable.

|                 | Df | Deviance | Resid. Df | Resid. Dev |
|-----------------|----|----------|-----------|------------|
| grade           | 1  | 1.7      | 95        | 80.5       |
| ethnicity:grade | 3  | 7.2      | 92        | 73.3       |

We can add a captions to a flextable with `set_caption` but then we won't have access to Quarto's cross-format (Word, HTML, PDF) cross-referencing engine. We can also use `tab.cap="caption"` in the chunk yaml but again we don't get the cross-referencing engine.

```
set_caption(ft,  
  caption = "a table caption with set_caption",  
  style = "Table Caption")
```

### 3.3. Cross-references

In Quarto, table links use the table label `@tbl-tablabel` where `tablabel` is the label you put on the table chunk. In the text it looks like this Table 3.3 (note this is broken in Word output). The chunk yaml looks like this

```
#| label: tbl-tablabel  
#| tbl-cap: "my caption"
```

### 3.4. Dynamic table captions

You can create captions dynamically.

```
dt <- mtcars[1:10, 1:6]  
tbl_cap <- paste("This is a dynamically created caption. The length of mtcars is", nrow(dt))
```

Unfortunately you cannot dynamically create your chunk labels too.

### 3. Tables intro

Table 3.1.: This is a simple table.

|                   | mpg  | cyl | disp  | hp  | drat | wt    |
|-------------------|------|-----|-------|-----|------|-------|
| Mazda RX4         | 21.0 | 6   | 160.0 | 110 | 3.90 | 2.620 |
| Mazda RX4 Wag     | 21.0 | 6   | 160.0 | 110 | 3.90 | 2.875 |
| Datsun 710        | 22.8 | 4   | 108.0 | 93  | 3.85 | 2.320 |
| Hornet 4 Drive    | 21.4 | 6   | 258.0 | 110 | 3.08 | 3.215 |
| Hornet Sportabout | 18.7 | 8   | 360.0 | 175 | 3.15 | 3.440 |
| Valiant           | 18.1 | 6   | 225.0 | 105 | 2.76 | 3.460 |
| Duster 360        | 14.3 | 8   | 360.0 | 245 | 3.21 | 3.570 |
| Merc 240D         | 24.4 | 4   | 146.7 | 62  | 3.69 | 3.190 |
| Merc 230          | 22.8 | 4   | 140.8 | 95  | 3.92 | 3.150 |
| Merc 280          | 19.2 | 6   | 167.6 | 123 | 3.92 | 3.440 |

*Note:*

kable

Table 3.3.: This is a table with a number.

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1954 | NA  | NA  | NA  | NA  | NA  | NA  | 1   | 1   | 2   | 3   | 2   | 1   |
| 1955 | 3   | 3   | 3   | 4   | 5   | 6   | 6   | 7   | 9   | 9   | 10  | 9   |
| 1956 | 10  | 10  | 10  | 12  | 14  | 14  | 16  | 16  | 17  | 17  | 19  | 20  |
| 1957 | 22  | 24  | 24  | 27  | 26  | 28  | 30  | 32  | 32  | 34  | 35  | 37  |
| 1958 | 37  | 37  | 37  | 36  | 36  | 39  | 41  | 42  | 41  | 43  | 46  | 47  |
| 1959 | 48  | 49  | 52  | 53  | 53  | 55  | 56  | 58  | 60  | 60  | 61  | 63  |
| 1960 | 66  | 67  | 67  | 68  | 70  | 70  | 72  | 73  | 75  | 75  | 76  | 77  |
| 1961 | 79  | 78  | 78  | 80  | 81  | 83  | 83  | 86  | 87  | 88  | 88  | 90  |
| 1962 | 89  | 88  | 87  | 88  | 90  | 91  | 93  | 94  | 95  | 97  | NA  | NA  |

*Note:*

kable

### 3. Tables intro

Table 3.4.: This is a dynamically created caption. The length of mtcars is 32 rows. Here we show 10 rows.

|                   | mpg  | cyl | disp  | hp  | drat | wt    |
|-------------------|------|-----|-------|-----|------|-------|
| Mazda RX4         | 21.0 | 6   | 160.0 | 110 | 3.90 | 2.620 |
| Mazda RX4 Wag     | 21.0 | 6   | 160.0 | 110 | 3.90 | 2.875 |
| Datsun 710        | 22.8 | 4   | 108.0 | 93  | 3.85 | 2.320 |
| Hornet 4 Drive    | 21.4 | 6   | 258.0 | 110 | 3.08 | 3.215 |
| Hornet Sportabout | 18.7 | 8   | 360.0 | 175 | 3.15 | 3.440 |
| Valiant           | 18.1 | 6   | 225.0 | 105 | 2.76 | 3.460 |
| Duster 360        | 14.3 | 8   | 360.0 | 245 | 3.21 | 3.570 |
| Merc 240D         | 24.4 | 4   | 146.7 | 62  | 3.69 | 3.190 |
| Merc 230          | 22.8 | 4   | 140.8 | 95  | 3.92 | 3.150 |
| Merc 280          | 19.2 | 6   | 167.6 | 123 | 3.92 | 3.440 |

*Note:*

kable



## 4. Tables in a for loop

Outputting tables (or figure) in a for loop works fine in Quarto, but there is no way to set the table numbers dynamically and get all the cross-references working in Word, HTML and PDF. We really need that dynamic numbering and cross-reference feature in a big report.

### 4.1. Example of tables produced in a for loop

Look at the [Code](#) (link at top in HTML output) to see the `cat(knitr::knit_print(tab))` trick for getting your tables to appear.

### 4.2. Getting the cross-reference links

We have to use a bit of magic to get our dynamic table numbers and links using Quarto's cross-referencing. The trick is to use a child Rmd (or qmd) in a for loop. This trick can be used for figures too but I'll just show it here with tables. This code inspired from [this gist](#).

We use `knit_expand()` and make a child Rmd that uses double curly braces like `{{value.to.match}}` in the code. That way the value at the time this Rmd was embedded can be referenced. Note that if `value.to.match` were a string (which it is not in this example), we would need to add quotes around `{{value.to.match}}` in our code.

Table 4.1.: We can set a caption but no way to cross-reference it

|               | mpg | cyl | disp | hp  |
|---------------|-----|-----|------|-----|
| Mazda RX4     | 21  | 6   | 160  | 110 |
| Mazda RX4 Wag | 21  | 6   | 160  | 110 |

*Note:*

kable

#### 4. Tables in a for loop

Table 4.2.: We can set a caption but no way to cross-reference it

|               | mpg | cyl | disp | hp  |
|---------------|-----|-----|------|-----|
| Mazda RX4     | 21  | 6   | 160  | 110 |
| Mazda RX4 Wag | 21  | 6   | 160  | 110 |

*Note:*  
kable

Table 4.3.: Cars with 4 cylinders. These tables have cross-ref links via @tbl-xyz.

|            | mpg  | cyl | disp  | hp |
|------------|------|-----|-------|----|
| Datsun 710 | 22.8 | 4   | 108.0 | 93 |
| Merc 240D  | 24.4 | 4   | 146.7 | 62 |
| Merc 230   | 22.8 | 4   | 140.8 | 95 |

*Note:*  
kable

With this approach we get our numbered tables and we can reference the tables usual such as Table 4.4 (note this is broken in Word output). Click on the Code link at top (HTML output) to see how it's done.

Table 4.4.: Cars with 8 cylinders. These tables have cross-ref links via @tbl-xyz.

|                   | mpg  | cyl | disp  | hp  |
|-------------------|------|-----|-------|-----|
| Hornet Sportabout | 18.7 | 8   | 360.0 | 175 |
| Duster 360        | 14.3 | 8   | 360.0 | 245 |
| Merc 450SE        | 16.4 | 8   | 275.8 | 180 |

*Note:*  
kable

## 5. Kable vs Flex vs qt

Here I compare a three different ways to make tables. Unfortunately the table numbers and cross-references are still not working as of Quarto version 1.2.335 (Feb 2023), but the developers are aware and a major revamp of cross-referencing is in the works to fix these problems.

### 5.1. Kable

Here is the `{kable}` table Table 5.1. Word output is often not good looking. This is a known issue with `kable`.

```
library(knitr)
library(kableExtra)
# note hold_position not working in Quarto v1.0.38.
kbl(dt, booktabs = TRUE) %>%
  kable_styling(latex_options = c("scale_down")) %>%
  kableExtra::footnote(symbol = c(f1, f2))
```

#### 5.1.1. kable quirks

- Make sure to put `always_allow_html: true` in the yaml at the top of your Rmd or qmd file if outputting to Word. I can't figure out how to put it in the ‘
- Word output is often not good looking. This is a known issue with `kable`
- Do not pass in caption to `kbl()` if you want to use Quarto's cross-reference engine.
- `kbl(..., format="pandoc")` can help for Word if your templates stop working but destroys the PDF output.

### 5.2. flextable

Here is the `{flextable}` table Table 5.2 (note this is broken in Word output). `{flextable}` gives you a lot more control over your tables with a grammar format (like `ggplot2`). It also gives nice output to Word, PDF and HTML. Sadly in Quarto v1.2.335 cross-reference and table numbers for Word is broken, but the developers know about this. The `{officer}`

## 5. Kable vs Flex vs qt

Table 5.1.: kable: This should have a number that follows the other tables.

|                   | mpg  | cyl | disp  | hp  | drat | wt    | qsec  | vs | am | gear | carb |
|-------------------|------|-----|-------|-----|------|-------|-------|----|----|------|------|
| Mazda RX4         | 21.0 | 6   | 160.0 | 110 | 3.90 | 2.620 | 16.46 | 0  | 1  | 4    | 4    |
| Mazda RX4 Wag     | 21.0 | 6   | 160.0 | 110 | 3.90 | 2.875 | 17.02 | 0  | 1  | 4    | 4    |
| Datsun 710        | 22.8 | 4   | 108.0 | 93  | 3.85 | 2.320 | 18.61 | 1  | 1  | 4    | 1    |
| Hornet 4 Drive    | 21.4 | 6   | 258.0 | 110 | 3.08 | 3.215 | 19.44 | 1  | 0  | 3    | 1    |
| Hornet Sportabout | 18.7 | 8   | 360.0 | 175 | 3.15 | 3.440 | 17.02 | 0  | 0  | 3    | 2    |
| Valiant           | 18.1 | 6   | 225.0 | 105 | 2.76 | 3.460 | 20.22 | 1  | 0  | 3    | 1    |
| Duster 360        | 14.3 | 8   | 360.0 | 245 | 3.21 | 3.570 | 15.84 | 0  | 0  | 3    | 4    |
| Merc 240D         | 24.4 | 4   | 146.7 | 62  | 3.69 | 3.190 | 20.00 | 1  | 0  | 4    | 2    |
| Merc 230          | 22.8 | 4   | 140.8 | 95  | 3.92 | 3.150 | 22.90 | 1  | 0  | 4    | 2    |
| Merc 280          | 19.2 | 6   | 167.6 | 123 | 3.92 | 3.440 | 18.30 | 1  | 0  | 4    | 4    |

\* Here is a footnote about this table

† Here is a second footnote.

package, which I think Quarto is leaning on for Word generation, use {flextable} so I am hoping that {flextable} gets moved into the RStudio suite.

```
library(flextable)
dt %>%
  flextable() %>%
  autofit() %>%
  flextable::footnote(i = 1, j = 1:2,
    value = as_paragraph(c(f1, f2)),
    ref_symbols = c("a", "b"),
    part = "header") %>%
  font(fontname="Times New Roman", part="all") %>%
  fontsize(size=12)
```

Table 5.2.: flextable: This should have a number that follows the other tables.

| mpg <sup>a</sup> | cyl <sup>b</sup> | disp  | hp  | drat | wt    | qsec  | vs | am | gear | carb |
|------------------|------------------|-------|-----|------|-------|-------|----|----|------|------|
| 21.0             | 6                | 160.0 | 110 | 3.90 | 2.620 | 16.46 | 0  | 1  | 4    | 4    |
| 21.0             | 6                | 160.0 | 110 | 3.90 | 2.875 | 17.02 | 0  | 1  | 4    | 4    |
| 22.8             | 4                | 108.0 | 93  | 3.85 | 2.320 | 18.61 | 1  | 1  | 4    | 1    |
| 21.4             | 6                | 258.0 | 110 | 3.08 | 3.215 | 19.44 | 1  | 0  | 3    | 1    |
| 18.7             | 8                | 360.0 | 175 | 3.15 | 3.440 | 17.02 | 0  | 0  | 3    | 2    |

## 5. Kable vs Flex vs qt

Table 5.2.: flextable: This should have a number that follows the other tables.

| mpg <sup>a</sup> | cyl <sup>b</sup> | disp  | hp  | drat | wt    | qsec  | vs | am | gear | carb |
|------------------|------------------|-------|-----|------|-------|-------|----|----|------|------|
| 18.1             | 6                | 225.0 | 105 | 2.76 | 3.460 | 20.22 | 1  | 0  | 3    | 1    |
| 14.3             | 8                | 360.0 | 245 | 3.21 | 3.570 | 15.84 | 0  | 0  | 3    | 4    |
| 24.4             | 4                | 146.7 | 62  | 3.69 | 3.190 | 20.00 | 1  | 0  | 4    | 2    |
| 22.8             | 4                | 140.8 | 95  | 3.92 | 3.150 | 22.90 | 1  | 0  | 4    | 2    |
| 19.2             | 6                | 167.6 | 123 | 3.92 | 3.440 | 18.30 | 1  | 0  | 4    | 4    |

<sup>a</sup>Here is a footnote about this table

<sup>b</sup>Here is a second footnote.

### 5.2.1. flextable quirks

- Table numbers and cross-refs broken in Word. Known issue.

## 5.3. gt

Here is the {gt} table Table 5.3 (note this is broken in Word output). {gt} has many of the same features as {flextable} and is in the RStudio suite so maybe it'll get more Quarto support in the long run. But like {kable}, the Word output is not good. In addition, currently table captions are broken in Quarto Word output.

```
dt %>%
  gt::gt() %>%
  gt::tab_source_note(source_note = f1) %>%
  gt::tab_source_note(source_note = f2) %>%
  gt::tab_options(
    table.font.size = gt::px(18),
    table.font.names = "Times New Roman",
    data_row.padding = gt::px(1))
```

Table 5.3.: gt: This should have a number that follows the other tables.

| mpg  | cyl | disp  | hp  | drat | wt    | qsec  | vs | am | gear | carb |
|------|-----|-------|-----|------|-------|-------|----|----|------|------|
| 21.0 | 6   | 160.0 | 110 | 3.90 | 2.620 | 16.46 | 0  | 1  | 4    | 4    |
| 21.0 | 6   | 160.0 | 110 | 3.90 | 2.875 | 17.02 | 0  | 1  | 4    | 4    |

### 5. *Kable* vs *Flex* vs *qt*

|      |   |       |     |      |       |       |   |   |   |   |
|------|---|-------|-----|------|-------|-------|---|---|---|---|
| 22.8 | 4 | 108.0 | 93  | 3.85 | 2.320 | 18.61 | 1 | 1 | 4 | 1 |
| 21.4 | 6 | 258.0 | 110 | 3.08 | 3.215 | 19.44 | 1 | 0 | 3 | 1 |
| 18.7 | 8 | 360.0 | 175 | 3.15 | 3.440 | 17.02 | 0 | 0 | 3 | 2 |
| 18.1 | 6 | 225.0 | 105 | 2.76 | 3.460 | 20.22 | 1 | 0 | 3 | 1 |
| 14.3 | 8 | 360.0 | 245 | 3.21 | 3.570 | 15.84 | 0 | 0 | 3 | 4 |
| 24.4 | 4 | 146.7 | 62  | 3.69 | 3.190 | 20.00 | 1 | 0 | 4 | 2 |
| 22.8 | 4 | 140.8 | 95  | 3.92 | 3.150 | 22.90 | 1 | 0 | 4 | 2 |
| 19.2 | 6 | 167.6 | 123 | 3.92 | 3.440 | 18.30 | 1 | 0 | 4 | 4 |

Here is a footnote about this table

Here is a second footnote.

#### 5.3.1. **gt** quirks

- I couldn't get {gt} to respect my font request for HTML unlike for {flextable}
- The footnotes look bad in Word. But I don't know {gt} so probably my error.
- Table captions and numbers broken in Word.

## 6. Figures intro

This chapter shows a few simple examples of including figures and getting cross-referencing to work across formats (HTML, Word, PDF).

### 6.1. ggplot2

We can see in Figure 6.1 that there are many time series. The number of panels is chosen automatically using {ggplot2}.

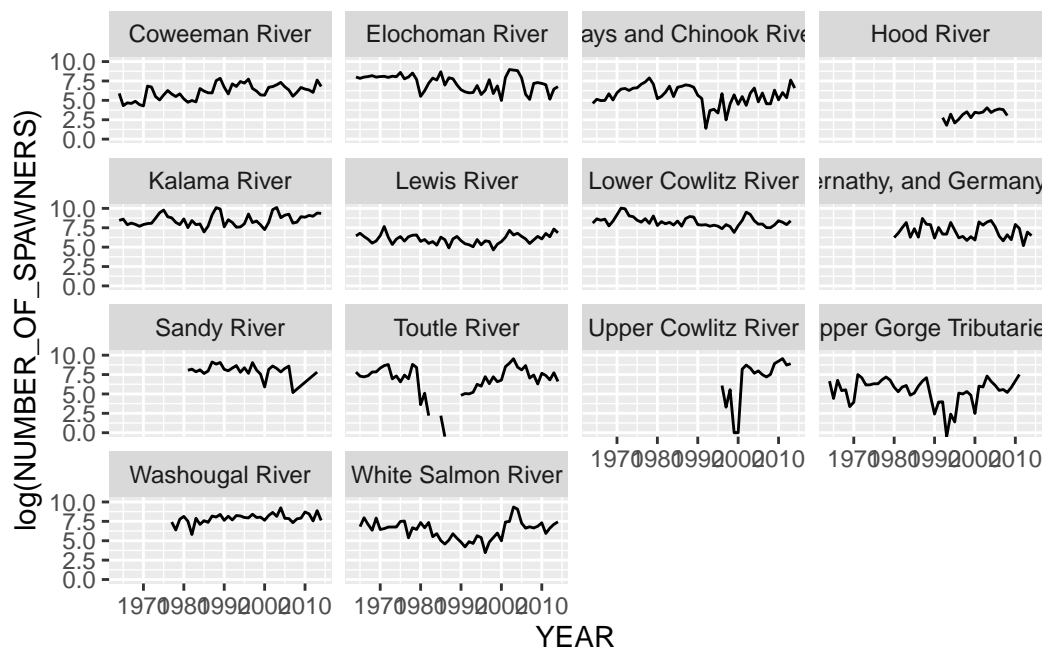


Figure 6.1.: Plot of the data

## 7. Conclusion

### 7.1. First off

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nam commodo sit amet nibh non molestie. Maecenas hendrerit nisl velit, a condimentum enim lobortis sit amet. Ut vitae nunc sed mauris condimentum fermentum. Mauris pellentesque nec neque id elementum. Suspendisse a quam aliquam, facilisis urna venenatis, malesuada diam. Pellentesque in fringilla orci. Cras sed purus urna. Ut pharetra enim ut ligula egestas mattis.

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Quisque in nibh sit amet nunc mollis porttitor quis et mauris. Sed non condimentum leo, ac condimentum est. Duis ac venenatis nulla, et aliquet elit. Suspendisse potenti. Duis mollis dui at semper luctus. Maecenas euismod finibus condimentum. Fusce vitae gravida massa. Mauris metus est, pretium non semper vel, dictum vel augue.

Curabitur tempus, leo quis volutpat rhoncus, turpis elit vehicula dolor, id tincidunt augue nunc at enim. In vel enim mattis, varius orci at, tempus ante. Morbi massa elit, pharetra ac libero at, porta tempus quam. Ut fringilla, tortor ac tristique euismod, magna felis vestibulum turpis, quis congue mauris leo nec felis. Aliquam viverra et nibh ut blandit. Praesent sed luctus odio. Pellentesque finibus velit dolor. Morbi ac pulvinar ex, id dapibus eros. Cras interdum arcu viverra auctor tristique. Suspendisse venenatis volutpat ultricies.

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## *7. Conclusion*

Phasellus id enim maximus, tempus tellus eu, dignissim sapien. Integer et mauris in lectus condimentum pellentesque non a felis.

## References

## **A. CRchum.csv**

Table A.1.: Spawners and fracwild from Grays & Chinook Rs. for 2001 to 2010.

| Year | Spawners | Fracwild |
|------|----------|----------|
| 2001 | 4742     | 0.895    |
| 2002 | 11713    | 0.896    |
| 2003 | 16669    | 0.933    |
| 2004 | 13716    | 0.959    |
| 2005 | 4204     | 0.903    |
| 2006 | 6605     | 0.933    |
| 2007 | 3999     | 0.955    |
| 2008 | 2608     | 0.921    |
| 2009 | 2876     | 0.965    |
| 2010 | 6380     | 0.953    |

*Note:*

kable

\*\* data file: CRchum.csv mod

date: Sat Aug 13 16:58:50

2022 -0600

\* These spawner counts are  
from river redd surveys.

Table A.2.: Spawners and fracwild from Washougal R. for 2005 to 2010.

|    | Year | Spawners | Fracwild |
|----|------|----------|----------|
| 19 | 2005 | 923      | 0.977    |
| 20 | 2006 | 869      | -99.000  |
| 21 | 2007 | 576      | -99.000  |
| 22 | 2008 | 644      | -99.000  |
| 23 | 2009 | 1154     | 0.969    |
| 24 | 2010 | 2148     | -99.000  |

*Note:*

kable

\*\* data file: CRchum.csv mod date:  
Sat Aug 13 16:58:50 2022 -0600

\* These spawner counts are from  
river redd surveys.

## **B. HCchum.csv**

Table B.1.: Spawners and fracwild from Strait of Juan de Fuca for 2000 to 2010.

|    | Year | Spawners | Fracwild |
|----|------|----------|----------|
| 30 | 2000 | 801      | 0.49     |
| 31 | 2001 | 3733     | 0.36     |
| 32 | 2002 | 6791     | 0.61     |
| 33 | 2003 | 6752     | 0.62     |
| 34 | 2004 | 9280     | 0.60     |
| 35 | 2005 | 9619     | 0.62     |
| 36 | 2006 | 8181     | 0.82     |
| 37 | 2007 | 3219     | 0.93     |
| 38 | 2008 | 3449     | 0.86     |
| 39 | 2009 | 5029     | 0.59     |
| 40 | 2010 | 9179     | 0.65     |

*Note:*

kable

\*\* data file: HCchum.csv mod date:  
Sat Aug 13 16:58:50 2022 -0600

\* These spawner counts are from  
river redd surveys.

Table B.2.: Spawners and fracwild from Hood Canal for 2000 to 2010.

|    | Year | Spawners | Fracwild |
|----|------|----------|----------|
| 82 | 2000 | 7987     | 0.67     |
| 83 | 2001 | 11491    | 0.60     |
| 84 | 2002 | 10818    | 0.60     |
| 85 | 2003 | 35173    | 0.77     |
| 86 | 2004 | 69565    | 0.86     |
| 87 | 2005 | 15311    | 0.72     |
| 88 | 2006 | 26418    | 0.80     |
| 89 | 2007 | 10539    | 0.87     |
| 90 | 2008 | 15112    | 0.88     |
| 91 | 2009 | 7236     | 0.89     |
| 92 | 2010 | 12533    | 0.91     |

*Note:*

kable

\*\* data file: HCchum.csv mod date:  
Sat Aug 13 16:58:50 2022 -0600

\* These spawner counts are from  
river redd surveys.