Data-analysis

#Libraries and Parameters

```
library(tidyverse) #used for easy data manipulation
```

```
## ── Attaching packages ──────────────────────────────────────

## ✔ ggplot2 3.1.1       ✔ purrr   0.3.2
## ✔ tibble  2.1.1       ✔ dplyr   0.8.0.1
## ✔ tidyr   0.8.3       ✔ stringr 1.4.0
## ✔ readr   1.3.1       ✔ forcats 0.4.0

## ── Conflicts ───────────────────────────────────────────────
## ✖ dplyr::filter() masks stats::filter()
## ✖ dplyr::lag()    masks stats::lag()
```

```
library(lubridate) #used for date manipulation
```

```
##
## Attaching package: 'lubridate'

## The following object is masked from 'package:base':
##
##     date
```

```
#Loading file names from local machine. If you want this code to run on your local machi
file_opening1_2019 <- "~/Autumn-2019/COMM177b/rising-waters/2019-Opening1.Rds"
file_opening2_2019 <- "~/Autumn-2019/COMM177b/rising-waters/2019-Opening2.Rds"
file_opening1_2018 <- "~/Autumn-2019/COMM177b/rising-waters/2018-Opening1.Rds"
file_opening1_2016 <- "~/Autumn-2019/COMM177b/rising-waters/2016-Opening1.Rds"
```

#Loading Files

```
#Opening files into data tables (called tibbles) for manipulation in the program. We are
opening1_2019 <- read_rds(file_opening1_2019)
opening2_2019 <- read_rds(file_opening2_2019)
opening1_2018 <- read_rds(file_opening1_2018)
opening1_2016 <- read_rds(file_opening1_2016)
```

#Combining Files

```
#combining all data into a single data frame (tibble), and adding a date column
openings <-
  opening1_2019 %>%
  bind_rows(opening2_2019) %>%
  bind_rows(opening1_2018) %>%
  bind_rows(opening1_2016) %>%
  mutate(year = year(date))
```

#Exploratory Analysis

How much water total was released in each opening?

```
total_water_discharged <-
  openings %>%
  group_by(opening_id) %>%
  summarize(total_water = sum(discharge))
```

```
total_water_discharged %>%
  ggplot(mapping = aes(x = opening_id, y = total_water)) +
  geom_point() +
  geom_line(aes(group = 1)) +
  theme_light() +
  labs(
    title = "Total water discharged during openings has dramatically increased",
    x = "Year and number of opening",
    y = "Total water discharged during opening [cubic ft/s]"
  ) +
  scale_y_continuous(labels = scales::comma, limits = c(0, 10000000))
```

How has the progression of bay release patterns (number of individual bays opened) changed for successive openings? Hundreds of bays make up the Bonnet Carre spillway

```
openings %>%
  ggplot(mapping = aes(x = days_open, y = total_opened)) +
  geom_line(aes(group = opening_id, color = opening_id)) +
  theme_light() +
  theme(
    panel.grid.minor = element_blank()
  ) +
  labs(
    title = "Total bays open over course of spillway openings",
    x = "Day of opening",
    y = "Total bays open"
  ) +
  guides(color = guide_legend(title = "Opening Year & Number"))
```