

Midterm 2 W24

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Instructions

Answer the following questions and complete the exercises in RMarkdown. Please embed all of your code and push your final work to your repository. Your code must be organized, clean, and run free from errors. Remember, you must remove the `#` for any included code chunks to run. Be sure to add your name to the author header above.

Your code must knit in order to be considered. If you are stuck and cannot answer a question, then comment out your code and knit the document. You may use your notes, labs, and homework to help you complete this exam. Do not use any other resources- including AI assistance.

Don't forget to answer any questions that are asked in the prompt. Some questions will require a plot, but others do not- make sure to read each question carefully.

For the questions that require a plot, make sure to have clearly labeled axes and a title. Keep your plots clean and professional-looking, but you are free to add color and other aesthetics.

Be sure to follow the directions and upload your exam on Gradescope.

Background

In the `data` folder, you will find data about shark incidents in California between 1950-2022. The data (<https://catalog.data.gov/dataset/shark-incident-database-california-56167>) are from: State of California-Shark Incident Database.

Load the libraries

```
library("tidyverse")
library("janitor")
library("naniar")
library("RColorBrewer")
```

Load the data

Run the following code chunk to import the data.

```
sharks <- read_csv("data/SharkIncidents_1950_2022_220302.csv") %>% clean_names()
```

Questions

- (1 point) Start by doing some data exploration using your preferred function(s). What is the structure of the data? Where are the missing values and how are they represented?

```
glimpse(sharks)
```

```
## Rows: 211
## Columns: 16
## $ incident_num    <chr> "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13", "14", "15", "16", "17", "18", "19", "20", "21", "22", "23", "24", "25", "26", "27", "28", "29", "30", "31", "32", "33", "34", "35", "36", "37", "38", "39", "40", "41", "42", "43", "44", "45", "46", "47", "48", "49", "50", "51", "52", "53", "54", "55", "56", "57", "58", "59", "60", "61", "62", "63", "64", "65", "66", "67", "68", "69", "70", "71", "72", "73", "74", "75", "76", "77", "78", "79", "80", "81", "82", "83", "84", "85", "86", "87", "88", "89", "90", "91", "92", "93", "94", "95", "96", "97", "98", "99", "100", "101", "102", "103", "104", "105", "106", "107", "108", "109", "110", "111", "112", "113", "114", "115", "116", "117", "118", "119", "120", "121", "122", "123", "124", "125", "126", "127", "128", "129", "130", "131", "132", "133", "134", "135", "136", "137", "138", "139", "140", "141", "142", "143", "144", "145", "146", "147", "148", "149", "150", "151", "152", "153", "154", "155", "156", "157", "158", "159", "160", "161", "162", "163", "164", "165", "166", "167", "168", "169", "170", "171", "172", "173", "174", "175", "176", "177", "178", "179", "180", "181", "182", "183", "184", "185", "186", "187", "188", "189", "190", "191", "192", "193", "194", "195", "196", "197", "198", "199", "200", "201", "202", "203", "204", "205", "206", "207", "208", "209", "210", "211"
## $ month            <dbl> 10, 5, 12, 2, 8, 4, 10, 5, 6, 7, 10, 11, 4, 5, 5, 8, ...
## $ day             <dbl> 8, 27, 7, 6, 14, 28, 12, 7, 14, 28, 4, 10, 24, 19, 21...
## $ year            <dbl> 1950, 1952, 1952, 1955, 1956, 1957, 1958, 1959, 1959,...
## $ time            <chr> "12:00", "14:00", "14:00", "12:00", "16:30", "13:30",...
## $ county          <chr> "San Diego", "San Diego", "Monterey", "Monterey", "Sa...
## $ location        <chr> "Imperial Beach", "Imperial Beach", "Lovers Point", "...
## $ mode            <chr> "Swimming", "Swimming", "Swimming", "Freediving", "Sw...
## $ injury          <chr> "major", "minor", "fatal", "minor", "major", "fatal",...
## $ depth           <chr> "surface", "surface", "surface", "surface", "surface"...
## $ species         <chr> "White", "White", "White", "White", "White", "White",...
## $ comment         <chr> "Body Surfing, bit multiple times on leg, thigh and b...
## $ longitude       <chr> "-117.1466667", "-117.2466667", "-122.05", "-122.15",...
## $ latitude        <dbl> 32.58833, 32.58833, 36.62667, 36.62667, 35.13833, 35...
## $ confirmed_source <chr> "Miller/Collier, Coronado Paper, Oceanside Paper", "G...
## $ wfl_case_number <chr> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, N...
```

```
sharks %>% naniar::miss_var_summary()
```

```
## # A tibble: 16 × 3
##   variable      n_miss pct_miss
##   <chr>        <int>    <dbl>
## 1 wfl_case_number    202    95.7
## 2 time              7     3.32
## 3 latitude          6     2.84
## 4 longitude          5     2.37
## 5 confirmed_source    1     0.474
## 6 incident_num        0     0
## 7 month              0     0
## 8 day                0     0
## 9 year               0     0
## 10 county            0     0
## 11 location          0     0
## 12 mode              0     0
## 13 injury            0     0
## 14 depth             0     0
## 15 species           0     0
## 16 comment           0     0
```

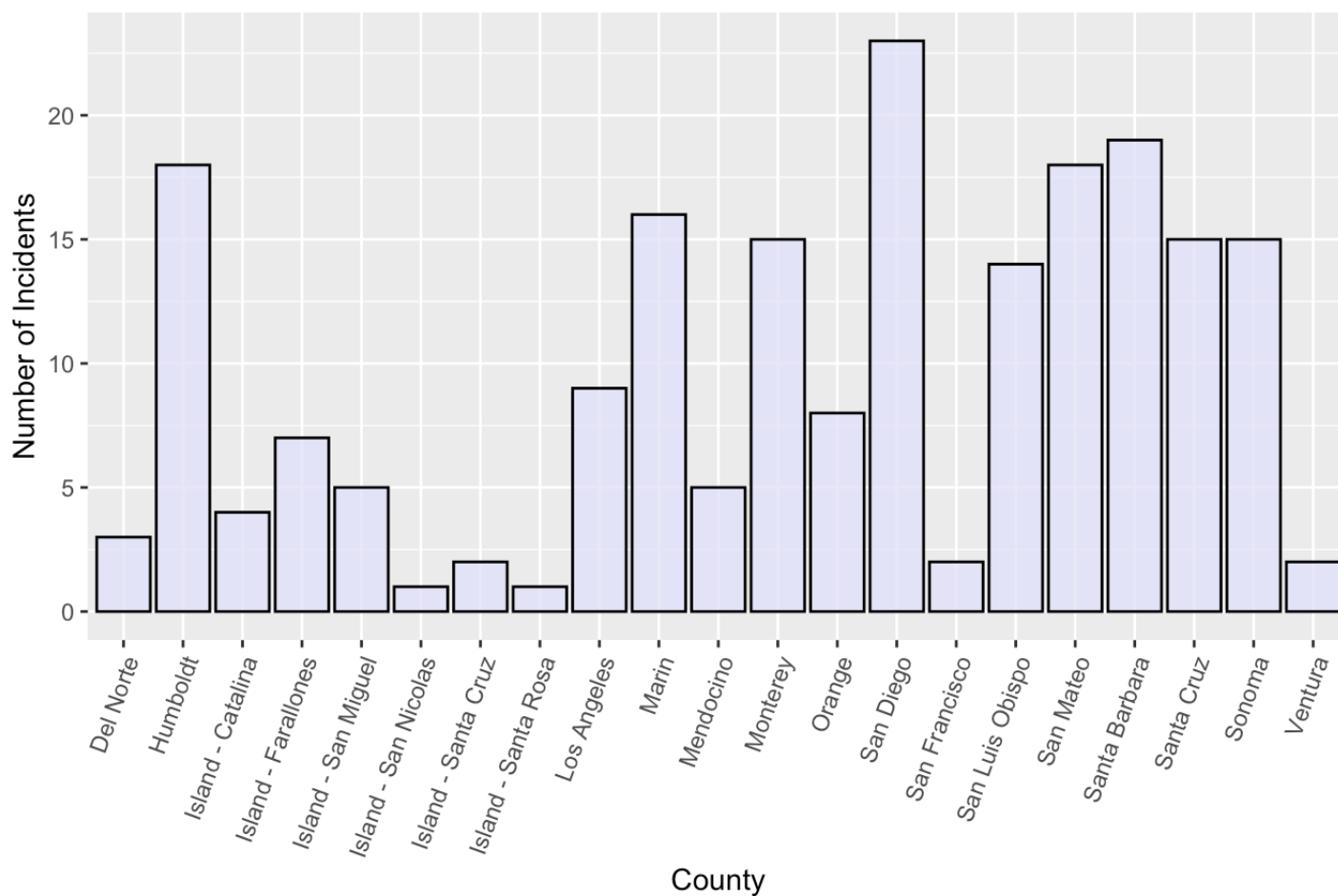
2. (1 point) Notice that there are some incidents identified as “NOT COUNTED”. These should be removed from the data because they were either not sharks, unverified, or were provoked. It’s OK to replace the `sharks` object.

```
sharks <- sharks %>%
  filter(incident_num!="NOT COUNTED")
```

3. (3 points) Are there any “hotspots” for shark incidents in California? Make a plot that shows the total number of incidents per county. Which county has the highest number of incidents? ##### San Diego

```
sharks %>%
  select(incident_num, county) %>%
  ggplot(aes(x=county))+
  geom_bar(alpha=0.9, fill="lavender", color="black") +
  labs(title="Incident Hotspots",
       x="County",
       y="Number of Incidents")+
  theme(plot.title=element_text(size=rel(1.75), hjust = 0.5))+
  theme(axis.text.x = element_text(angle = 70, hjust=1))
```

Incident Hotspots



```
theme_light()
```

```
## List of 97
## $ line                               :List of 6
## ..$ colour                          : chr "black"
## ..$ linewidth                       : num 0.5
## ..$ linetype                        : num 1
## ..$ lineend                         : chr "butt"
## ..$ arrow                           : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect                               :List of 5
## ..$ fill                            : chr "white"
## ..$ colour                          : chr "black"
## ..$ linewidth                       : num 0.5
## ..$ linetype                        : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text                               :List of 11
```

```

## ..$ family      : chr ""
## ..$ face        : chr "plain"
## ..$ colour      : chr "black"
## ..$ size        : num 11
## ..$ hjust       : num 0.5
## ..$ vjust       : num 0.5
## ..$ angle       : num 0
## ..$ lineheight  : num 0.9
## ..$ margin      : 'margin' num [1:4] 0points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title         : NULL
## $ aspect.ratio  : NULL
## $ axis.title    : NULL
## $ axis.title.x  :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 2.75points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 0
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 2.75points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom : NULL
## $ axis.title.y       :List of 11
## ..$ family          : NULL

```

```

## ..$ face      : NULL
## ..$ colour    : NULL
## ..$ size      : NULL
## ..$ hjust     : NULL
## ..$ vjust     : num 1
## ..$ angle     : num 90
## ..$ lineheight : NULL
## ..$ margin    : 'margin' num [1:4] 0points 2.75points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug     : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left      : NULL
## $ axis.title.y.right    :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 0
## ..$ angle       : num -90
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 0points 2.75points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text          :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : chr "grey30"
## ..$ size          : 'rel' num 0.8
## ..$ hjust         : NULL
## ..$ vjust         : NULL
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : NULL
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x        :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : NULL
## ..$ size          : NULL
## ..$ hjust         : NULL
## ..$ vjust         : num 1

```

```

## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 2.2points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top      :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 0
## ..$ angle           : NULL
## ..$ lineheight       : NULL
## ..$ margin          : 'margin' num [1:4] 0points 0points 2.2points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom   : NULL
## $ axis.text.y          :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : num 1
## ..$ vjust            : NULL
## ..$ angle           : NULL
## ..$ lineheight       : NULL
## ..$ margin          : 'margin' num [1:4] 0points 2.2points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.y.left     : NULL
## $ axis.text.y.right    :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : num 0
## ..$ vjust            : NULL
## ..$ angle           : NULL
## ..$ lineheight       : NULL
## ..$ margin          : 'margin' num [1:4] 0points 0points 0points 2.2points

```

```

## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.ticks :List of 6
## ..$ colour : chr "grey70"
## ..$ linewidth : 'rel' num 0.5
## ..$ linetype : NULL
## ..$ lineend : NULL
## ..$ arrow : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ axis.ticks.x : NULL
## $ axis.ticks.x.top : NULL
## $ axis.ticks.x.bottom : NULL
## $ axis.ticks.y : NULL
## $ axis.ticks.y.left : NULL
## $ axis.ticks.y.right : NULL
## $ axis.ticks.length : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ axis.ticks.length.x : NULL
## $ axis.ticks.length.x.top : NULL
## $ axis.ticks.length.x.bottom: NULL
## $ axis.ticks.length.y : NULL
## $ axis.ticks.length.y.left : NULL
## $ axis.ticks.length.y.right : NULL
## $ axis.line : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ axis.line.x : NULL
## $ axis.line.x.top : NULL
## $ axis.line.x.bottom : NULL
## $ axis.line.y : NULL
## $ axis.line.y.left : NULL
## $ axis.line.y.right : NULL
## $ legend.background :List of 5
## ..$ fill : NULL
## ..$ colour : logi NA
## ..$ linewidth : NULL
## ..$ linetype : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.margin : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ legend.spacing : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ legend.spacing.x : NULL

```



```

## $ legend.spacing.y          : NULL
## $ legend.key                :List of 5
## ..$ fill                   : chr "white"
## ..$ colour                 : logi NA
## ..$ linewidth              : NULL
## ..$ linetype               : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.key.size           : 'simpleUnit' num 1.2lines
## ..- attr(*, "unit")= int 3
## $ legend.key.height         : NULL
## $ legend.key.width          : NULL
## $ legend.text               :List of 11
## ..$ family                 : NULL
## ..$ face                   : NULL
## ..$ colour                 : NULL
## ..$ size                   : 'rel' num 0.8
## ..$ hjust                  : NULL
## ..$ vjust                  : NULL
## ..$ angle                  : NULL
## ..$ lineheight             : NULL
## ..$ margin                 : NULL
## ..$ debug                  : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.text.align         : NULL
## $ legend.title              :List of 11
## ..$ family                 : NULL
## ..$ face                   : NULL
## ..$ colour                 : NULL
## ..$ size                   : NULL
## ..$ hjust                  : num 0
## ..$ vjust                  : NULL
## ..$ angle                  : NULL
## ..$ lineheight             : NULL
## ..$ margin                 : NULL
## ..$ debug                  : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align        : NULL
## $ legend.position           : chr "right"
## $ legend.direction          : NULL
## $ legend.justification      : chr "center"
## $ legend.box                : NULL
## $ legend.box.just           : NULL
## $ legend.box.margin         : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1

```

```

## $ legend.box.background      : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing        : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ panel.background          :List of 5
## ..$ fill                    : chr "white"
## ..$ colour                   : logi NA
## ..$ linewidth                : NULL
## ..$ linetype                 : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border               :List of 5
## ..$ fill                     : logi NA
## ..$ colour                   : chr "grey70"
## ..$ linewidth                : 'rel' num 1
## ..$ linetype                 : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing              : 'simpleUnit' num 5.5points
## ..- attr(*, "unit")= int 8
## $ panel.spacing.x            : NULL
## $ panel.spacing.y            : NULL
## $ panel.grid                  :List of 6
## ..$ colour                   : chr "grey87"
## ..$ linewidth                : NULL
## ..$ linetype                 : NULL
## ..$ lineend                  : NULL
## ..$ arrow                    : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major           :List of 6
## ..$ colour                   : NULL
## ..$ linewidth                : 'rel' num 0.5
## ..$ linetype                 : NULL
## ..$ lineend                  : NULL
## ..$ arrow                    : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor           :List of 6
## ..$ colour                   : NULL
## ..$ linewidth                : 'rel' num 0.25
## ..$ linetype                 : NULL
## ..$ lineend                  : NULL
## ..$ arrow                    : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x         : NULL

```

```
## $ panel.grid.major.y      : NULL
## $ panel.grid.minor.x     : NULL
## $ panel.grid.minor.y     : NULL
## $ panel.ontop            : logi FALSE
## $ plot.background        :List of 5
## ..$ fill                 : NULL
## ..$ colour               : chr "white"
## ..$ linewidth            : NULL
## ..$ linetype             : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title              :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : 'rel' num 1.2
## ..$ hjust                : num 0
## ..$ vjust                : num 1
## ..$ angle                : NULL
## ..$ lineheight           : NULL
## ..$ margin               : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position     : chr "panel"
## $ plot.subtitle           :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : NULL
## ..$ hjust                : num 0
## ..$ vjust                : num 1
## ..$ angle                : NULL
## ..$ lineheight           : NULL
## ..$ margin               : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption            :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : 'rel' num 0.8
## ..$ hjust                : num 1
## ..$ vjust                : num 1
```

```

## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 5.5points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag             :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : 'rel' num 1.2
## ..$ hjust           : num 0.5
## ..$ vjust           : num 0.5
## ..$ angle           : NULL
## ..$ lineheight      : NULL
## ..$ margin          : NULL
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position  : chr "topleft"
## $ plot.margin        : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ strip.background   :List of 5
## ..$ fill            : chr "grey70"
## ..$ colour          : logi NA
## ..$ linewidth       : NULL
## ..$ linetype        : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x : NULL
## $ strip.background.y : NULL
## $ strip.clip         : chr "inherit"
## $ strip.placement    : chr "inside"
## $ strip.text         :List of 11
## ..$ family          : NULL
## ..$ face            : NULL
## ..$ colour          : chr "white"
## ..$ size            : 'rel' num 0.8
## ..$ hjust          : NULL
## ..$ vjust          : NULL
## ..$ angle          : NULL
## ..$ lineheight     : NULL
## ..$ margin         : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## ..- attr(*, "unit")= int 8

```

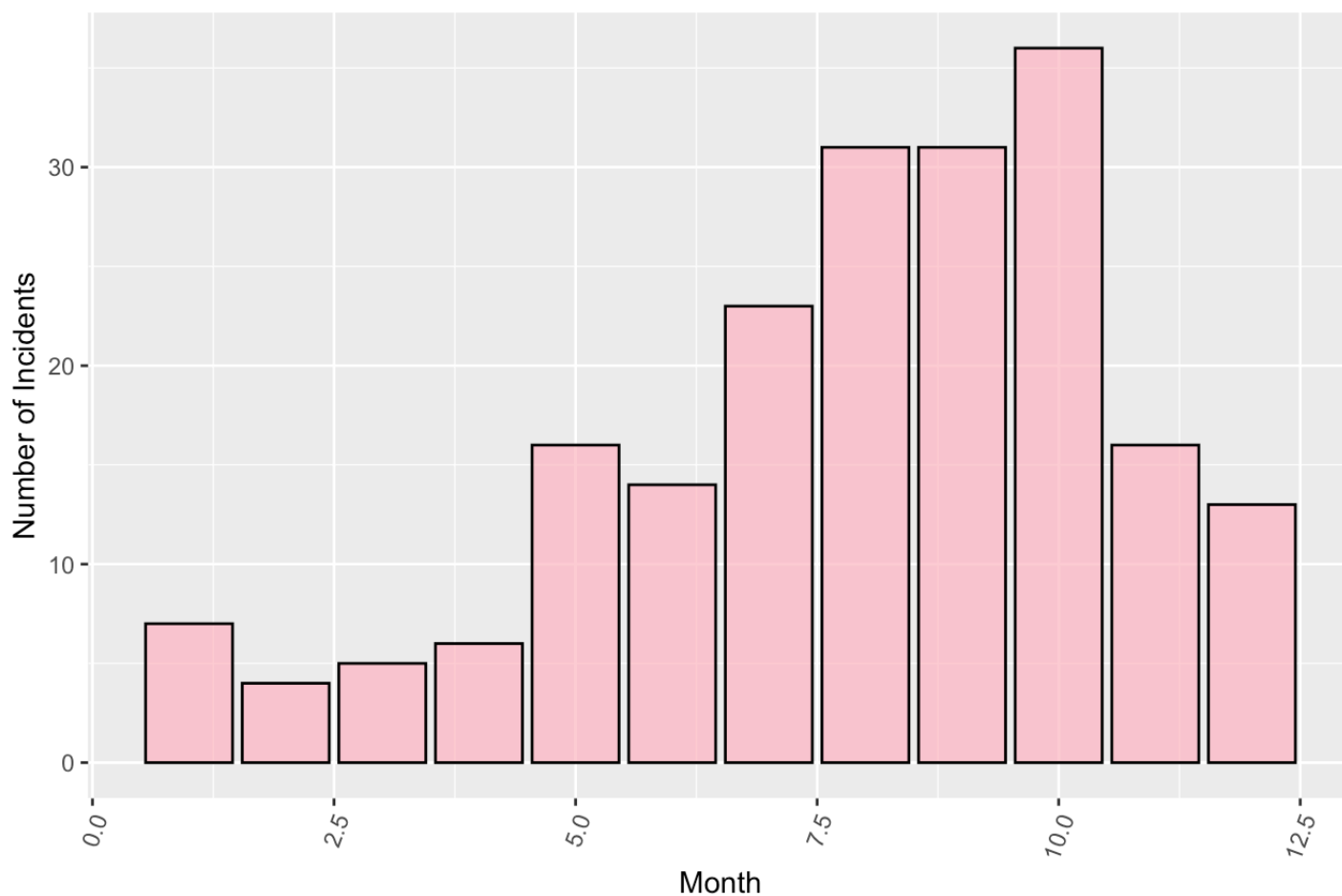
```
## ..$ debug          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x      : NULL
## $ strip.text.x.bottom : NULL
## $ strip.text.x.top   : NULL
## $ strip.text.y       :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : num -90
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.left  :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : num 90
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.right : NULL
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ strip.switch.pad.wrap : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## - attr(*, "class")= chr [1:2] "theme" "gg"
## - attr(*, "complete")= logi TRUE
## - attr(*, "validate")= logi TRUE
```

4. (3 points) Are there months of the year when incidents are more likely to occur? Make a plot that shows the total number of incidents by month. Which month has the highest number of incidents?

####October has the highest incidents

```
sharks %>%
  select(incident_num, month) %>%
  ggplot(aes(x=month))+
  geom_bar(alpha=0.7, fill="lightpink", color="black") +
  labs(title="Incidents per Month",
        x="Month",
        y="Number of Incidents")+
  theme(plot.title=element_text(size=rel(1.75), hjust = 0.5))+
  theme(axis.text.x = element_text(angle = 70, hjust=1))
```

Incidents per Month



```
theme_light()
```

```
## List of 97
## $ line :List of 6
## ..$ colour : chr "black"
## ..$ linewidth : num 0.5
## ..$ linetype : num 1
## ..$ lineend : chr "butt"
```

```

## ..$ arrow      : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect          :List of 5
## ..$ fill        : chr "white"
## ..$ colour      : chr "black"
## ..$ linewidth   : num 0.5
## ..$ linetype     : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text          :List of 11
## ..$ family      : chr ""
## ..$ face        : chr "plain"
## ..$ colour      : chr "black"
## ..$ size        : num 11
## ..$ hjust       : num 0.5
## ..$ vjust       : num 0.5
## ..$ angle       : num 0
## ..$ lineheight  : num 0.9
## ..$ margin      : 'margin' num [1:4] 0points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title         : NULL
## $ aspect.ratio   : NULL
## $ axis.title     : NULL
## $ axis.title.x    :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 2.75points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL

```

```

## ..$ vjust      : num 0
## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 0points 0points 2.75points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom      : NULL
## $ axis.title.y             :List of 11
## ..$ family                : NULL
## ..$ face                   : NULL
## ..$ colour                 : NULL
## ..$ size                   : NULL
## ..$ hjust                  : NULL
## ..$ vjust                  : num 1
## ..$ angle                  : num 90
## ..$ lineheight             : NULL
## ..$ margin                 : 'margin' num [1:4] 0points 2.75points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                  : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left        : NULL
## $ axis.title.y.right       :List of 11
## ..$ family                : NULL
## ..$ face                   : NULL
## ..$ colour                 : NULL
## ..$ size                   : NULL
## ..$ hjust                  : NULL
## ..$ vjust                  : num 0
## ..$ angle                  : num -90
## ..$ lineheight             : NULL
## ..$ margin                 : 'margin' num [1:4] 0points 0points 0points 2.75points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                  : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text                :List of 11
## ..$ family                : NULL
## ..$ face                   : NULL
## ..$ colour                 : chr "grey30"
## ..$ size                   : 'rel' num 0.8
## ..$ hjust                  : NULL
## ..$ vjust                  : NULL
## ..$ angle                  : NULL
## ..$ lineheight             : NULL

```



```

## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x      :List of 11
## ..$ family       : NULL
## ..$ face         : NULL
## ..$ colour       : NULL
## ..$ size         : NULL
## ..$ hjust        : NULL
## ..$ vjust        : num 1
## ..$ angle        : NULL
## ..$ lineheight    : NULL
## ..$ margin       : 'margin' num [1:4] 2.2points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top   :List of 11
## ..$ family       : NULL
## ..$ face         : NULL
## ..$ colour       : NULL
## ..$ size         : NULL
## ..$ hjust        : NULL
## ..$ vjust        : num 0
## ..$ angle        : NULL
## ..$ lineheight    : NULL
## ..$ margin       : 'margin' num [1:4] 0points 0points 2.2points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom : NULL
## $ axis.text.y      :List of 11
## ..$ family       : NULL
## ..$ face         : NULL
## ..$ colour       : NULL
## ..$ size         : NULL
## ..$ hjust        : num 1
## ..$ vjust        : NULL
## ..$ angle        : NULL
## ..$ lineheight    : NULL
## ..$ margin       : 'margin' num [1:4] 0points 2.2points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"

```

```

## $ axis.text.y.left      : NULL
## $ axis.text.y.right    :List of 11
## ..$ family            : NULL
## ..$ face              : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust             : num 0
## ..$ vjust             : NULL
## ..$ angle             : NULL
## ..$ lineheight        : NULL
## ..$ margin            : 'margin' num [1:4] 0points 0points 0points 2.2points
## ..- attr(*, "unit")= int 8
## ..$ debug             : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.ticks           :List of 6
## ..$ colour            : chr "grey70"
## ..$ linewidth        : 'rel' num 0.5
## ..$ linetype         : NULL
## ..$ lineend          : NULL
## ..$ arrow            : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ axis.ticks.x         : NULL
## $ axis.ticks.x.top     : NULL
## $ axis.ticks.x.bottom  : NULL
## $ axis.ticks.y         : NULL
## $ axis.ticks.y.left    : NULL
## $ axis.ticks.y.right   : NULL
## $ axis.ticks.length    : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ axis.ticks.length.x  : NULL
## $ axis.ticks.length.x.top : NULL
## $ axis.ticks.length.x.bottom: NULL
## $ axis.ticks.length.y  : NULL
## $ axis.ticks.length.y.left : NULL
## $ axis.ticks.length.y.right : NULL
## $ axis.line            : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ axis.line.x         : NULL
## $ axis.line.x.top     : NULL
## $ axis.line.x.bottom  : NULL
## $ axis.line.y         : NULL
## $ axis.line.y.left    : NULL
## $ axis.line.y.right   : NULL
## $ legend.background    :List of 5
## ..$ fill              : NULL

```

```
## ..$ colour      : logi NA
## ..$ linewidth   : NULL
## ..$ linetype    : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.margin      : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ legend.spacing     : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ legend.spacing.x   : NULL
## $ legend.spacing.y   : NULL
## $ legend.key         :List of 5
## ..$ fill            : chr "white"
## ..$ colour          : logi NA
## ..$ linewidth       : NULL
## ..$ linetype        : NULL
## ..$ inherit.blank   : logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.key.size    : 'simpleUnit' num 1.2lines
## ..- attr(*, "unit")= int 3
## $ legend.key.height  : NULL
## $ legend.key.width   : NULL
## $ legend.text        :List of 11
## ..$ family          : NULL
## ..$ face            : NULL
## ..$ colour          : NULL
## ..$ size            : 'rel' num 0.8
## ..$ hjust           : NULL
## ..$ vjust           : NULL
## ..$ angle           : NULL
## ..$ lineheight      : NULL
## ..$ margin          : NULL
## ..$ debug           : NULL
## ..$ inherit.blank   : logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.text.align  : NULL
## $ legend.title       :List of 11
## ..$ family          : NULL
## ..$ face            : NULL
## ..$ colour          : NULL
## ..$ size            : NULL
## ..$ hjust           : num 0
## ..$ vjust           : NULL
## ..$ angle           : NULL
## ..$ lineheight      : NULL
## ..$ margin          : NULL
```

```

## ..$ debug          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align      : NULL
## $ legend.position         : chr "right"
## $ legend.direction        : NULL
## $ legend.justification    : chr "center"
## $ legend.box              : NULL
## $ legend.box.just         : NULL
## $ legend.box.margin       : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1
## $ legend.box.background   : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing      : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ panel.background        :List of 5
## ..$ fill                  : chr "white"
## ..$ colour                : logi NA
## ..$ linewidth             : NULL
## ..$ linetype              : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border            :List of 5
## ..$ fill                  : logi NA
## ..$ colour                : chr "grey70"
## ..$ linewidth             : 'rel' num 1
## ..$ linetype              : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing           : 'simpleUnit' num 5.5points
## ..- attr(*, "unit")= int 8
## $ panel.spacing.x         : NULL
## $ panel.spacing.y         : NULL
## $ panel.grid               :List of 6
## ..$ colour                : chr "grey87"
## ..$ linewidth             : NULL
## ..$ linetype              : NULL
## ..$ lineend               : NULL
## ..$ arrow                 : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major        :List of 6
## ..$ colour                : NULL
## ..$ linewidth             : 'rel' num 0.5
## ..$ linetype              : NULL
## ..$ lineend               : NULL
## ..$ arrow                 : logi FALSE

```

```

## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor          :List of 6
## ..$ colour                 : NULL
## ..$ linewidth              : 'rel' num 0.25
## ..$ linetype               : NULL
## ..$ lineend                : NULL
## ..$ arrow                  : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x       : NULL
## $ panel.grid.major.y       : NULL
## $ panel.grid.minor.x       : NULL
## $ panel.grid.minor.y       : NULL
## $ panel.ontop              : logi FALSE
## $ plot.background          :List of 5
## ..$ fill                   : NULL
## ..$ colour                 : chr "white"
## ..$ linewidth              : NULL
## ..$ linetype               : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title                :List of 11
## ..$ family                 : NULL
## ..$ face                   : NULL
## ..$ colour                 : NULL
## ..$ size                   : 'rel' num 1.2
## ..$ hjust                  : num 0
## ..$ vjust                  : num 1
## ..$ angle                  : NULL
## ..$ lineheight             : NULL
## ..$ margin                 : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                  : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position       : chr "panel"
## $ plot.subtitle             :List of 11
## ..$ family                 : NULL
## ..$ face                   : NULL
## ..$ colour                 : NULL
## ..$ size                   : NULL
## ..$ hjust                  : num 0
## ..$ vjust                  : num 1
## ..$ angle                  : NULL
## ..$ lineheight             : NULL
## ..$ margin                 : 'margin' num [1:4] 0points 0points 5.5points 0points

```

```

## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : 'rel' num 0.8
## ..$ hjust : num 1
## ..$ vjust : num 1
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 5.5points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : 'rel' num 1.2
## ..$ hjust : num 0.5
## ..$ vjust : num 0.5
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : NULL
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position : chr "topleft"
## $ plot.margin : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ strip.background :List of 5
## ..$ fill : chr "grey70"
## ..$ colour : logi NA
## ..$ linewidth : NULL
## ..$ linetype : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x : NULL
## $ strip.background.y : NULL
## $ strip.clip : chr "inherit"
## $ strip.placement : chr "inside"

```

```
## $ strip.text :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : chr "white"
## ..$ size : 'rel' num 0.8
## ..$ hjust : NULL
## ..$ vjust : NULL
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x : NULL
## $ strip.text.x.bottom : NULL
## $ strip.text.x.top : NULL
## $ strip.text.y :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : NULL
## ..$ angle : num -90
## ..$ lineheight : NULL
## ..$ margin : NULL
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.left :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : NULL
## ..$ angle : num 90
## ..$ lineheight : NULL
## ..$ margin : NULL
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.right : NULL
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ strip.switch.pad.wrap : 'simpleUnit' num 2.75points
```

```
##   ..- attr(*, "unit")= int 8
##   - attr(*, "class")= chr [1:2] "theme" "gg"
##   - attr(*, "complete")= logi TRUE
##   - attr(*, "validate")= logi TRUE
```

5. (3 points) How do the number and types of injuries compare by county? Make a table (not a plot) that shows the number of injury types by county. Which county has the highest number of fatalities?

####San Diego

```
sharks %>%
  tabyl(injury, county)
```

```
##   injury Del Norte Humboldt Island - Catalina Island - Farallones
##   fatal      0      0      0      0
##   major      0      7      0      7
##   minor      2      2      1      0
##   none       1      9      3      0
##   Island - San Miguel Island - San Nicolas Island - Santa Cruz
##           1      0      0
##           2      0      0
##           2      1      1
##           0      0      1
##   Island - Santa Rosa Los Angeles Marin Mendocino Monterey Orange San Diego
##           0      1      0      1      2      0      2
##           1      0      9      3      8      1      4
##           0      6      4      1      2      2      8
##           0      2      3      0      3      5      9
##   San Francisco San Luis Obispo San Mateo Santa Barbara Santa Cruz Sonoma
##           1      3      1      2      1      0
##           0      3      1      2      3      8
##           0      1      4      6      3      1
##           1      7      12      9      8      6
##   Ventura
##       0
##       0
##       2
##       0
```

```
sharks %>%
  mutate(fatal_n = ifelse(injury == "fatal", 1, 0)) %>%
  count(county, fatal_n, sort=T)
```

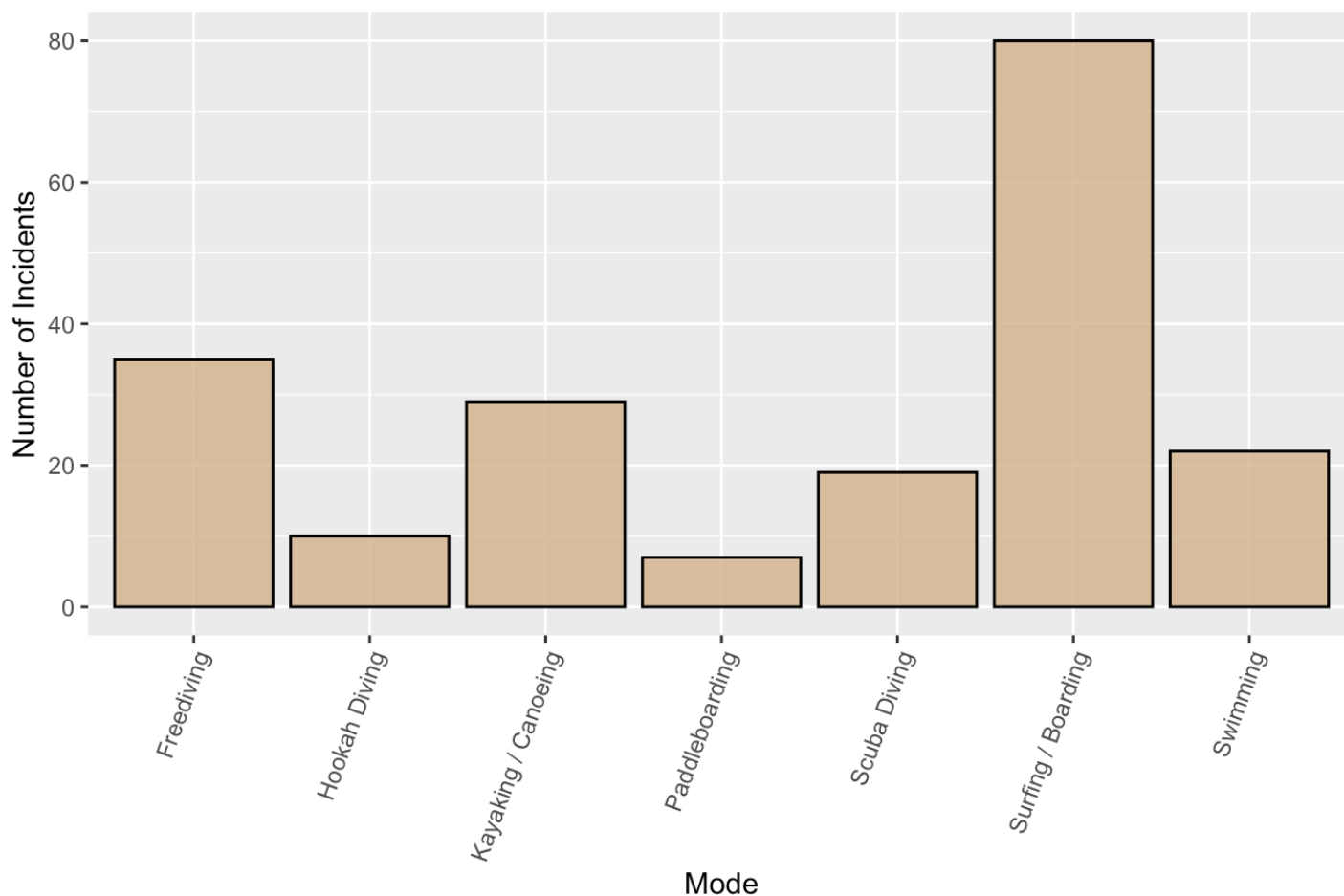


```
## # A tibble: 31 × 3
##   county      fatal_n      n
##   <chr>      <dbl> <int>
## 1 San Diego          0    21
## 2 Humboldt          0    18
## 3 San Mateo          0    17
## 4 Santa Barbara      0    17
## 5 Marin              0    16
## 6 Sonoma              0    15
## 7 Santa Cruz         0    14
## 8 Monterey           0    13
## 9 San Luis Obispo     0    11
## 10 Los Angeles        0     8
## # i 21 more rows
```

6. (2 points) In the data, `mode` refers to a type of activity. Which activity is associated with the highest number of incidents?

```
sharks %>%
  select(incident_num, mode) %>%
  ggplot(aes(x=mode))+
  geom_bar(alpha=0.8, fill="tan", color="black") +
  labs(title="Activity Done During Incident",
        x="Mode",
        y="Number of Incidents")+
  theme(plot.title=element_text(size=rel(1.75), hjust = 0.5))+
  theme(axis.text.x = element_text(angle = 70, hjust=1))
```

Activity Done During Incident



```
theme_light()
```

```
## List of 97
## $ line                               :List of 6
## ..$ colour                          : chr "black"
## ..$ linewidth                       : num 0.5
## ..$ linetype                        : num 1
## ..$ lineend                         : chr "butt"
## ..$ arrow                           : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect                               :List of 5
## ..$ fill                            : chr "white"
## ..$ colour                          : chr "black"
## ..$ linewidth                       : num 0.5
## ..$ linetype                        : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text                               :List of 11
```

```

## ..$ family      : chr ""
## ..$ face        : chr "plain"
## ..$ colour      : chr "black"
## ..$ size        : num 11
## ..$ hjust       : num 0.5
## ..$ vjust       : num 0.5
## ..$ angle       : num 0
## ..$ lineheight  : num 0.9
## ..$ margin      : 'margin' num [1:4] 0points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title         : NULL
## $ aspect.ratio  : NULL
## $ axis.title    : NULL
## $ axis.title.x  :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 2.75points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 0
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 2.75points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom : NULL
## $ axis.title.y       :List of 11
## ..$ family          : NULL

```

```

## ..$ face          : NULL
## ..$ colour        : NULL
## ..$ size          : NULL
## ..$ hjust         : NULL
## ..$ vjust         : num 1
## ..$ angle         : num 90
## ..$ lineheight    : NULL
## ..$ margin        : 'margin' num [1:4] 0points 2.75points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left      : NULL
## $ axis.title.y.right     :List of 11
## ..$ family          : NULL
## ..$ face            : NULL
## ..$ colour          : NULL
## ..$ size            : NULL
## ..$ hjust           : NULL
## ..$ vjust           : num 0
## ..$ angle           : num -90
## ..$ lineheight      : NULL
## ..$ margin          : 'margin' num [1:4] 0points 0points 0points 2.75points
## .. ..- attr(*, "unit")= int 8
## ..$ debug          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text             :List of 11
## ..$ family          : NULL
## ..$ face            : NULL
## ..$ colour          : chr "grey30"
## ..$ size            : 'rel' num 0.8
## ..$ hjust           : NULL
## ..$ vjust           : NULL
## ..$ angle           : NULL
## ..$ lineheight      : NULL
## ..$ margin          : NULL
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x           :List of 11
## ..$ family          : NULL
## ..$ face            : NULL
## ..$ colour          : NULL
## ..$ size            : NULL
## ..$ hjust           : NULL
## ..$ vjust           : num 1

```

```

## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 2.2points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top      :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 0
## ..$ angle           : NULL
## ..$ lineheight       : NULL
## ..$ margin          : 'margin' num [1:4] 0points 0points 2.2points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom   : NULL
## $ axis.text.y          :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : num 1
## ..$ vjust            : NULL
## ..$ angle           : NULL
## ..$ lineheight       : NULL
## ..$ margin          : 'margin' num [1:4] 0points 2.2points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.y.left     : NULL
## $ axis.text.y.right    :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : num 0
## ..$ vjust            : NULL
## ..$ angle           : NULL
## ..$ lineheight       : NULL
## ..$ margin          : 'margin' num [1:4] 0points 0points 0points 2.2points

```

```

## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.ticks :List of 6
## ..$ colour : chr "grey70"
## ..$ linewidth : 'rel' num 0.5
## ..$ linetype : NULL
## ..$ lineend : NULL
## ..$ arrow : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ axis.ticks.x : NULL
## $ axis.ticks.x.top : NULL
## $ axis.ticks.x.bottom : NULL
## $ axis.ticks.y : NULL
## $ axis.ticks.y.left : NULL
## $ axis.ticks.y.right : NULL
## $ axis.ticks.length : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ axis.ticks.length.x : NULL
## $ axis.ticks.length.x.top : NULL
## $ axis.ticks.length.x.bottom: NULL
## $ axis.ticks.length.y : NULL
## $ axis.ticks.length.y.left : NULL
## $ axis.ticks.length.y.right : NULL
## $ axis.line : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ axis.line.x : NULL
## $ axis.line.x.top : NULL
## $ axis.line.x.bottom : NULL
## $ axis.line.y : NULL
## $ axis.line.y.left : NULL
## $ axis.line.y.right : NULL
## $ legend.background :List of 5
## ..$ fill : NULL
## ..$ colour : logi NA
## ..$ linewidth : NULL
## ..$ linetype : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.margin : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ legend.spacing : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ legend.spacing.x : NULL

```

```

## $ legend.spacing.y          : NULL
## $ legend.key                :List of 5
## ..$ fill                    : chr "white"
## ..$ colour                  : logi NA
## ..$ linewidth               : NULL
## ..$ linetype                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.key.size           : 'simpleUnit' num 1.2lines
## ..- attr(*, "unit")= int 3
## $ legend.key.height         : NULL
## $ legend.key.width          : NULL
## $ legend.text                :List of 11
## ..$ family                  : NULL
## ..$ face                    : NULL
## ..$ colour                  : NULL
## ..$ size                    : 'rel' num 0.8
## ..$ hjust                   : NULL
## ..$ vjust                   : NULL
## ..$ angle                   : NULL
## ..$ lineheight              : NULL
## ..$ margin                  : NULL
## ..$ debug                   : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.text.align         : NULL
## $ legend.title               :List of 11
## ..$ family                  : NULL
## ..$ face                    : NULL
## ..$ colour                  : NULL
## ..$ size                    : NULL
## ..$ hjust                   : num 0
## ..$ vjust                   : NULL
## ..$ angle                   : NULL
## ..$ lineheight              : NULL
## ..$ margin                  : NULL
## ..$ debug                   : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align        : NULL
## $ legend.position            : chr "right"
## $ legend.direction           : NULL
## $ legend.justification       : chr "center"
## $ legend.box                 : NULL
## $ legend.box.just            : NULL
## $ legend.box.margin          : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1

```

```

## $ legend.box.background      : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing        : 'simpleUnit' num 11points
##   ..- attr(*, "unit")= int 8
## $ panel.background          :List of 5
##   ..$ fill                  : chr "white"
##   ..$ colour                 : logi NA
##   ..$ linewidth             : NULL
##   ..$ linetype              : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border              :List of 5
##   ..$ fill                  : logi NA
##   ..$ colour                 : chr "grey70"
##   ..$ linewidth             : 'rel' num 1
##   ..$ linetype              : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing             : 'simpleUnit' num 5.5points
##   ..- attr(*, "unit")= int 8
## $ panel.spacing.x           : NULL
## $ panel.spacing.y           : NULL
## $ panel.grid                 :List of 6
##   ..$ colour                 : chr "grey87"
##   ..$ linewidth             : NULL
##   ..$ linetype              : NULL
##   ..$ lineend               : NULL
##   ..$ arrow                  : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major           :List of 6
##   ..$ colour                 : NULL
##   ..$ linewidth             : 'rel' num 0.5
##   ..$ linetype              : NULL
##   ..$ lineend               : NULL
##   ..$ arrow                  : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor          :List of 6
##   ..$ colour                 : NULL
##   ..$ linewidth             : 'rel' num 0.25
##   ..$ linetype              : NULL
##   ..$ lineend               : NULL
##   ..$ arrow                  : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x        : NULL

```



```

## $ panel.grid.major.y      : NULL
## $ panel.grid.minor.x     : NULL
## $ panel.grid.minor.y     : NULL
## $ panel.ontop             : logi FALSE
## $ plot.background        :List of 5
## ..$ fill                 : NULL
## ..$ colour               : chr "white"
## ..$ linewidth            : NULL
## ..$ linetype             : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title              :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : 'rel' num 1.2
## ..$ hjust                : num 0
## ..$ vjust                : num 1
## ..$ angle                : NULL
## ..$ lineheight           : NULL
## ..$ margin               : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position     : chr "panel"
## $ plot.subtitle           :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : NULL
## ..$ hjust                : num 0
## ..$ vjust                : num 1
## ..$ angle                : NULL
## ..$ lineheight           : NULL
## ..$ margin               : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption            :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : 'rel' num 0.8
## ..$ hjust                : num 1
## ..$ vjust                : num 1

```

```

## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 5.5points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag             :List of 11
## ..$ family           : NULL
## ..$ face              : NULL
## ..$ colour           : NULL
## ..$ size              : 'rel' num 1.2
## ..$ hjust             : num 0.5
## ..$ vjust             : num 0.5
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position   : chr "topleft"
## $ plot.margin         : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.
5points
## ..- attr(*, "unit")= int 8
## $ strip.background    :List of 5
## ..$ fill              : chr "grey70"
## ..$ colour            : logi NA
## ..$ linewidth         : NULL
## ..$ linetype          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x  : NULL
## $ strip.background.y  : NULL
## $ strip.clip           : chr "inherit"
## $ strip.placement     : chr "inside"
## $ strip.text           :List of 11
## ..$ family           : NULL
## ..$ face              : NULL
## ..$ colour           : chr "white"
## ..$ size              : 'rel' num 0.8
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## ..- attr(*, "unit")= int 8

```

```
## ..$ debug          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x      : NULL
## $ strip.text.x.bottom : NULL
## $ strip.text.x.top   : NULL
## $ strip.text.y       :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : num -90
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.left  :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : num 90
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.right : NULL
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ strip.switch.pad.wrap : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## - attr(*, "class")= chr [1:2] "theme" "gg"
## - attr(*, "complete")= logi TRUE
## - attr(*, "validate")= logi TRUE
```

7. (4 points) Use faceting to make a plot that compares the number and types of injuries by activity. (hint: the x axes should be the type of injury)

```
sharks %>%
  select(incident_num, mode, injury) %>%
  ggplot(aes(x=injury))+
  geom_bar(alpha=0.5, fill="red3", color="black") +
  labs(title="Activity Done During Incident and Injury",
       x="Type of Injury",
       y="Number of Incidents")+
  facet_wrap(~mode)+
  theme(plot.title=element_text(size=rel(1.25), hjust = 0.5))+
  theme(axis.text.x = element_text(angle = 70, hjust=1))
```

Activity Done During Incident and Injury



```
theme_light()
```

```
## List of 97
## $ line                               :List of 6
## ..$ colour                          : chr "black"
## ..$ linewidth                       : num 0.5
## ..$ linetype                        : num 1
```

```

## ..$ lineend      : chr "butt"
## ..$ arrow        : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect           :List of 5
## ..$ fill         : chr "white"
## ..$ colour       : chr "black"
## ..$ linewidth    : num 0.5
## ..$ linetype     : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text           :List of 11
## ..$ family       : chr ""
## ..$ face         : chr "plain"
## ..$ colour       : chr "black"
## ..$ size         : num 11
## ..$ hjust        : num 0.5
## ..$ vjust        : num 0.5
## ..$ angle        : num 0
## ..$ lineheight   : num 0.9
## ..$ margin       : 'margin' num [1:4] 0points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug        : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title          : NULL
## $ aspect.ratio   : NULL
## $ axis.title      : NULL
## $ axis.title.x    :List of 11
## ..$ family       : NULL
## ..$ face         : NULL
## ..$ colour       : NULL
## ..$ size         : NULL
## ..$ hjust        : NULL
## ..$ vjust        : num 1
## ..$ angle        : NULL
## ..$ lineheight   : NULL
## ..$ margin       : 'margin' num [1:4] 2.75points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug        : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top :List of 11
## ..$ family       : NULL
## ..$ face         : NULL
## ..$ colour       : NULL
## ..$ size         : NULL

```

```

## ..$ hjust      : NULL
## ..$ vjust      : num 0
## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 0points 0points 2.75points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom      : NULL
## $ axis.title.y             :List of 11
## ..$ family                : NULL
## ..$ face                  : NULL
## ..$ colour                : NULL
## ..$ size                  : NULL
## ..$ hjust                 : NULL
## ..$ vjust                 : num 1
## ..$ angle                 : num 90
## ..$ lineheight           : NULL
## ..$ margin               : 'margin' num [1:4] 0points 2.75points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                : NULL
## ..$ inherit.blank        : logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left       : NULL
## $ axis.title.y.right      :List of 11
## ..$ family                : NULL
## ..$ face                  : NULL
## ..$ colour                : NULL
## ..$ size                  : NULL
## ..$ hjust                 : NULL
## ..$ vjust                 : num 0
## ..$ angle                 : num -90
## ..$ lineheight           : NULL
## ..$ margin               : 'margin' num [1:4] 0points 0points 0points 2.75points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                : NULL
## ..$ inherit.blank        : logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text               :List of 11
## ..$ family                : NULL
## ..$ face                  : NULL
## ..$ colour                : chr "grey30"
## ..$ size                  : 'rel' num 0.8
## ..$ hjust                 : NULL
## ..$ vjust                 : NULL
## ..$ angle                 : NULL

```

```

## ..$ lineheight : NULL
## ..$ margin : NULL
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 1
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 2.2points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 0
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 0points 2.2points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom : NULL
## $ axis.text.y :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : num 1
## ..$ vjust : NULL
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 2.2points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE

```

```

##  ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.text.y.left      : NULL
##  $ axis.text.y.right    :List of 11
##  ..$ family             : NULL
##  ..$ face               : NULL
##  ..$ colour             : NULL
##  ..$ size               : NULL
##  ..$ hjust              : num 0
##  ..$ vjust              : NULL
##  ..$ angle              : NULL
##  ..$ lineheight         : NULL
##  ..$ margin             : 'margin' num [1:4] 0points 0points 0points 2.2points
##  ..  ..- attr(*, "unit")= int 8
##  ..$ debug              : NULL
##  ..$ inherit.blank: logi TRUE
##  ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.ticks            :List of 6
##  ..$ colour             : chr "grey70"
##  ..$ linewidth          : 'rel' num 0.5
##  ..$ linetype           : NULL
##  ..$ lineend            : NULL
##  ..$ arrow              : logi FALSE
##  ..$ inherit.blank: logi TRUE
##  ..- attr(*, "class")= chr [1:2] "element_line" "element"
##  $ axis.ticks.x          : NULL
##  $ axis.ticks.x.top      : NULL
##  $ axis.ticks.x.bottom   : NULL
##  $ axis.ticks.y          : NULL
##  $ axis.ticks.y.left     : NULL
##  $ axis.ticks.y.right    : NULL
##  $ axis.ticks.length     : 'simpleUnit' num 2.75points
##  ..- attr(*, "unit")= int 8
##  $ axis.ticks.length.x   : NULL
##  $ axis.ticks.length.x.top : NULL
##  $ axis.ticks.length.x.bottom: NULL
##  $ axis.ticks.length.y   : NULL
##  $ axis.ticks.length.y.left : NULL
##  $ axis.ticks.length.y.right : NULL
##  $ axis.line             : list()
##  ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ axis.line.x           : NULL
##  $ axis.line.x.top       : NULL
##  $ axis.line.x.bottom    : NULL
##  $ axis.line.y           : NULL
##  $ axis.line.y.left      : NULL
##  $ axis.line.y.right     : NULL
##  $ legend.background     :List of 5

```



```

## ..$ fill      : NULL
## ..$ colour    : logi NA
## ..$ linewidth : NULL
## ..$ linetype  : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.margin      : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ legend.spacing     : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ legend.spacing.x   : NULL
## $ legend.spacing.y   : NULL
## $ legend.key          :List of 5
## ..$ fill            : chr "white"
## ..$ colour          : logi NA
## ..$ linewidth       : NULL
## ..$ linetype        : NULL
## ..$ inherit.blank   : logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.key.size    : 'simpleUnit' num 1.2lines
## ..- attr(*, "unit")= int 3
## $ legend.key.height  : NULL
## $ legend.key.width   : NULL
## $ legend.text        :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : 'rel' num 0.8
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank    : logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.text.align  : NULL
## $ legend.title       :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : num 0
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL

```

```

## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align      : NULL
## $ legend.position         : chr "right"
## $ legend.direction        : NULL
## $ legend.justification    : chr "center"
## $ legend.box              : NULL
## $ legend.box.just         : NULL
## $ legend.box.margin       : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1
## $ legend.box.background   : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing      : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ panel.background        :List of 5
## ..$ fill                  : chr "white"
## ..$ colour                : logi NA
## ..$ linewidth            : NULL
## ..$ linetype              : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border            :List of 5
## ..$ fill                  : logi NA
## ..$ colour                : chr "grey70"
## ..$ linewidth            : 'rel' num 1
## ..$ linetype              : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing           : 'simpleUnit' num 5.5points
## ..- attr(*, "unit")= int 8
## $ panel.spacing.x         : NULL
## $ panel.spacing.y         : NULL
## $ panel.grid               :List of 6
## ..$ colour                : chr "grey87"
## ..$ linewidth            : NULL
## ..$ linetype              : NULL
## ..$ lineend               : NULL
## ..$ arrow                 : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major        :List of 6
## ..$ colour                : NULL
## ..$ linewidth            : 'rel' num 0.5
## ..$ linetype              : NULL
## ..$ lineend               : NULL

```

```

## ..$ arrow      : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor      :List of 6
## ..$ colour      : NULL
## ..$ linewidth    : 'rel' num 0.25
## ..$ linetype     : NULL
## ..$ lineend      : NULL
## ..$ arrow        : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x    : NULL
## $ panel.grid.major.y    : NULL
## $ panel.grid.minor.x    : NULL
## $ panel.grid.minor.y    : NULL
## $ panel.ontop           : logi FALSE
## $ plot.background       :List of 5
## ..$ fill           : NULL
## ..$ colour         : chr "white"
## ..$ linewidth      : NULL
## ..$ linetype       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title           :List of 11
## ..$ family         : NULL
## ..$ face           : NULL
## ..$ colour         : NULL
## ..$ size           : 'rel' num 1.2
## ..$ hjust         : num 0
## ..$ vjust         : num 1
## ..$ angle         : NULL
## ..$ lineheight     : NULL
## ..$ margin         : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position   : chr "panel"
## $ plot.subtitle        :List of 11
## ..$ family         : NULL
## ..$ face           : NULL
## ..$ colour         : NULL
## ..$ size           : NULL
## ..$ hjust         : num 0
## ..$ vjust         : num 1
## ..$ angle         : NULL
## ..$ lineheight     : NULL

```

```
## ..$ margin      : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption   :List of 11
## ..$ family       : NULL
## ..$ face         : NULL
## ..$ colour       : NULL
## ..$ size         : 'rel' num 0.8
## ..$ hjust        : num 1
## ..$ vjust        : num 1
## ..$ angle        : NULL
## ..$ lineheight   : NULL
## ..$ margin       : 'margin' num [1:4] 5.5points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag         :List of 11
## ..$ family       : NULL
## ..$ face         : NULL
## ..$ colour       : NULL
## ..$ size         : 'rel' num 1.2
## ..$ hjust        : num 0.5
## ..$ vjust        : num 0.5
## ..$ angle        : NULL
## ..$ lineheight   : NULL
## ..$ margin       : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position   : chr "topleft"
## $ plot.margin         : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.
5points
## ..- attr(*, "unit")= int 8
## $ strip.background    :List of 5
## ..$ fill             : chr "grey70"
## ..$ colour           : logi NA
## ..$ linewidth        : NULL
## ..$ linetype         : NULL
## ..$ inherit.blank    : logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x  : NULL
## $ strip.background.y  : NULL
## $ strip.clip          : chr "inherit"
```

```

## $ strip.placement      : chr "inside"
## $ strip.text           :List of 11
## ..$ family            : NULL
## ..$ face              : NULL
## ..$ colour            : chr "white"
## ..$ size              : 'rel' num 0.8
## ..$ hjust             : NULL
## ..$ vjust             : NULL
## ..$ angle             : NULL
## ..$ lineheight        : NULL
## ..$ margin            : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x         : NULL
## $ strip.text.x.bottom  : NULL
## $ strip.text.x.top     : NULL
## $ strip.text.y         :List of 11
## ..$ family            : NULL
## ..$ face              : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust             : NULL
## ..$ vjust             : NULL
## ..$ angle             : num -90
## ..$ lineheight        : NULL
## ..$ margin            : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.left    :List of 11
## ..$ family            : NULL
## ..$ face              : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust             : NULL
## ..$ vjust             : NULL
## ..$ angle             : num 90
## ..$ lineheight        : NULL
## ..$ margin            : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.right   : NULL
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8

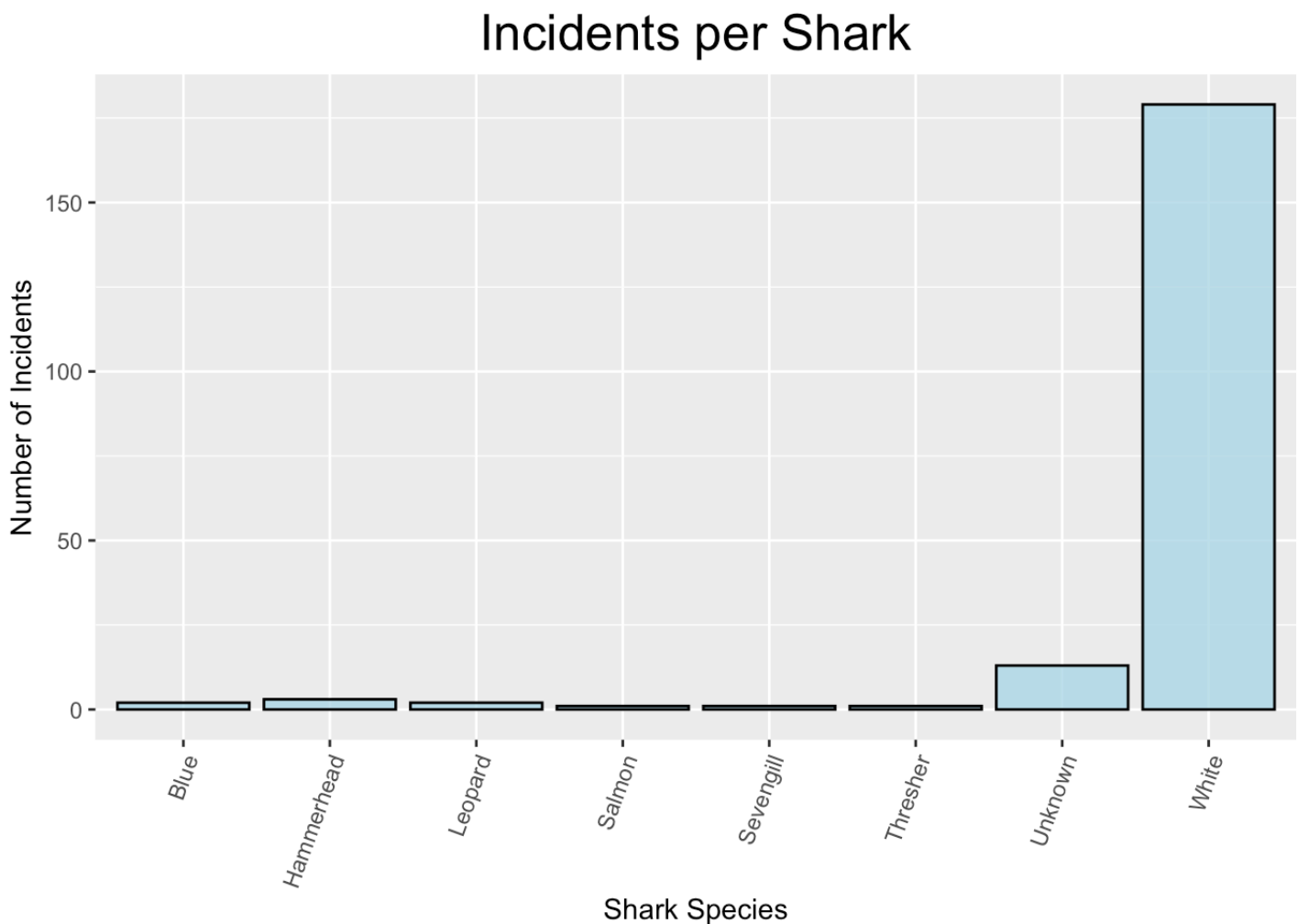
```

```
## $ strip.switch.pad.wrap      : 'simpleUnit' num 2.75points
##   ..- attr(*, "unit")= int 8
## - attr(*, "class")= chr [1:2] "theme" "gg"
## - attr(*, "complete")= logi TRUE
## - attr(*, "validate")= logi TRUE
```

8. (1 point) Which shark species is involved in the highest number of incidents?

Great Whites

```
sharks %>%
  select(incident_num, species) %>%
  ggplot(aes(x=species))+
  geom_bar(alpha=0.8, fill="lightblue", color="black") +
  labs(title="Incidents per Shark",
       x="Shark Species",
       y="Number of Incidents")+
  theme(plot.title=element_text(size=rel(1.75), hjust = 0.5))+
  theme(axis.text.x = element_text(angle = 70, hjust=1))
```



```
theme_light()
```

```
## List of 97
## $ line :List of 6
## ..$ colour : chr "black"
## ..$ linewidth : num 0.5
## ..$ linetype : num 1
## ..$ lineend : chr "butt"
## ..$ arrow : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect :List of 5
## ..$ fill : chr "white"
## ..$ colour : chr "black"
## ..$ linewidth : num 0.5
## ..$ linetype : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text :List of 11
## ..$ family : chr ""
## ..$ face : chr "plain"
## ..$ colour : chr "black"
## ..$ size : num 11
## ..$ hjust : num 0.5
## ..$ vjust : num 0.5
## ..$ angle : num 0
## ..$ lineheight : num 0.9
## ..$ margin : 'margin' num [1:4] 0points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title : NULL
## $ aspect.ratio : NULL
## $ axis.title : NULL
## $ axis.title.x :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 1
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 2.75points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
```

```

## ..$ debug          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top      :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 0
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 2.75points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom   : NULL
## $ axis.title.y          :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 1
## ..$ angle            : num 90
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 2.75points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left     : NULL
## $ axis.title.y.right    :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 0
## ..$ angle            : num -90
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 0points 2.75points
## .. ..- attr(*, "unit")= int 8
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"

```



```

## $ axis.text                               :List of 11
## ..$ family                               : NULL
## ..$ face                                 : NULL
## ..$ colour                               : chr "grey30"
## ..$ size                                 : 'rel' num 0.8
## ..$ hjust                               : NULL
## ..$ vjust                               : NULL
## ..$ angle                               : NULL
## ..$ lineheight                           : NULL
## ..$ margin                              : NULL
## ..$ debug                               : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x                             :List of 11
## ..$ family                               : NULL
## ..$ face                                 : NULL
## ..$ colour                               : NULL
## ..$ size                                 : NULL
## ..$ hjust                               : NULL
## ..$ vjust                               : num 1
## ..$ angle                               : NULL
## ..$ lineheight                           : NULL
## ..$ margin                              : 'margin' num [1:4] 2.2points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                               : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top                         :List of 11
## ..$ family                               : NULL
## ..$ face                                 : NULL
## ..$ colour                               : NULL
## ..$ size                                 : NULL
## ..$ hjust                               : NULL
## ..$ vjust                               : num 0
## ..$ angle                               : NULL
## ..$ lineheight                           : NULL
## ..$ margin                              : 'margin' num [1:4] 0points 0points 2.2points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                               : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom                     : NULL
## $ axis.text.y                             :List of 11
## ..$ family                               : NULL
## ..$ face                                 : NULL
## ..$ colour                               : NULL
## ..$ size                                 : NULL

```

```

## ..$ hjust      : num 1
## ..$ vjust      : NULL
## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 0points 2.2points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.y.left      : NULL
## $ axis.text.y.right     :List of 11
## ..$ family            : NULL
## ..$ face              : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust             : num 0
## ..$ vjust             : NULL
## ..$ angle             : NULL
## ..$ lineheight        : NULL
## ..$ margin            : 'margin' num [1:4] 0points 0points 0points 2.2points
## .. ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.ticks           :List of 6
## ..$ colour            : chr "grey70"
## ..$ linewidth         : 'rel' num 0.5
## ..$ linetype          : NULL
## ..$ lineend           : NULL
## ..$ arrow             : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ axis.ticks.x         : NULL
## $ axis.ticks.x.top     : NULL
## $ axis.ticks.x.bottom  : NULL
## $ axis.ticks.y         : NULL
## $ axis.ticks.y.left    : NULL
## $ axis.ticks.y.right   : NULL
## $ axis.ticks.length    : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ axis.ticks.length.x  : NULL
## $ axis.ticks.length.x.top : NULL
## $ axis.ticks.length.x.bottom: NULL
## $ axis.ticks.length.y  : NULL
## $ axis.ticks.length.y.left : NULL
## $ axis.ticks.length.y.right : NULL
## $ axis.line            : list()

```

```

##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##   $ axis.line.x           : NULL
##   $ axis.line.x.top       : NULL
##   $ axis.line.x.bottom    : NULL
##   $ axis.line.y           : NULL
##   $ axis.line.y.left      : NULL
##   $ axis.line.y.right     : NULL
##   $ legend.background     :List of 5
##   ..$ fill                : NULL
##   ..$ colour              : logi NA
##   ..$ linewidth          : NULL
##   ..$ linetype            : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
##   $ legend.margin         : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.
5points
##   ..- attr(*, "unit")= int 8
##   $ legend.spacing        : 'simpleUnit' num 11points
##   ..- attr(*, "unit")= int 8
##   $ legend.spacing.x      : NULL
##   $ legend.spacing.y      : NULL
##   $ legend.key             :List of 5
##   ..$ fill                : chr "white"
##   ..$ colour              : logi NA
##   ..$ linewidth          : NULL
##   ..$ linetype            : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
##   $ legend.key.size       : 'simpleUnit' num 1.2lines
##   ..- attr(*, "unit")= int 3
##   $ legend.key.height     : NULL
##   $ legend.key.width      : NULL
##   $ legend.text           :List of 11
##   ..$ family              : NULL
##   ..$ face                 : NULL
##   ..$ colour              : NULL
##   ..$ size                 : 'rel' num 0.8
##   ..$ hjust                : NULL
##   ..$ vjust                : NULL
##   ..$ angle                : NULL
##   ..$ lineheight          : NULL
##   ..$ margin              : NULL
##   ..$ debug                : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##   $ legend.text.align     : NULL
##   $ legend.title          :List of 11

```

```

## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : num 0
## ..$ vjust       : NULL
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align      : NULL
## $ legend.position         : chr "right"
## $ legend.direction        : NULL
## $ legend.justification    : chr "center"
## $ legend.box              : NULL
## $ legend.box.just         : NULL
## $ legend.box.margin       : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1
## $ legend.box.background   : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing      : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ panel.background        :List of 5
## ..$ fill                  : chr "white"
## ..$ colour                : logi NA
## ..$ linewidth             : NULL
## ..$ linetype              : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border            :List of 5
## ..$ fill                  : logi NA
## ..$ colour                : chr "grey70"
## ..$ linewidth             : 'rel' num 1
## ..$ linetype              : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing           : 'simpleUnit' num 5.5points
## ..- attr(*, "unit")= int 8
## $ panel.spacing.x         : NULL
## $ panel.spacing.y         : NULL
## $ panel.grid               :List of 6
## ..$ colour                : chr "grey87"
## ..$ linewidth             : NULL
## ..$ linetype              : NULL
## ..$ lineend               : NULL

```

```

## ..$ arrow          : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major      :List of 6
## ..$ colour          : NULL
## ..$ linewidth       : 'rel' num 0.5
## ..$ linetype        : NULL
## ..$ lineend         : NULL
## ..$ arrow          : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor      :List of 6
## ..$ colour          : NULL
## ..$ linewidth       : 'rel' num 0.25
## ..$ linetype        : NULL
## ..$ lineend         : NULL
## ..$ arrow          : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x    : NULL
## $ panel.grid.major.y    : NULL
## $ panel.grid.minor.x    : NULL
## $ panel.grid.minor.y    : NULL
## $ panel.ontop           : logi FALSE
## $ plot.background       :List of 5
## ..$ fill             : NULL
## ..$ colour           : chr "white"
## ..$ linewidth       : NULL
## ..$ linetype        : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title            :List of 11
## ..$ family          : NULL
## ..$ face            : NULL
## ..$ colour          : NULL
## ..$ size            : 'rel' num 1.2
## ..$ hjust          : num 0
## ..$ vjust          : num 1
## ..$ angle          : NULL
## ..$ lineheight     : NULL
## ..$ margin         : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position   : chr "panel"
## $ plot.subtitle        :List of 11

```

```

## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : num 0
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 5.5points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption      :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : 'rel' num 0.8
## ..$ hjust       : num 1
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 5.5points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag          :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : 'rel' num 1.2
## ..$ hjust       : num 0.5
## ..$ vjust       : num 0.5
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position   : chr "topleft"
## $ plot.margin         : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ strip.background    :List of 5
## ..$ fill             : chr "grey70"

```

```

## ..$ colour      : logi NA
## ..$ linewidth   : NULL
## ..$ linetype    : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x      : NULL
## $ strip.background.y      : NULL
## $ strip.clip              : chr "inherit"
## $ strip.placement         : chr "inside"
## $ strip.text              :List of 11
## ..$ family             : NULL
## ..$ face               : NULL
## ..$ colour             : chr "white"
## ..$ size               : 'rel' num 0.8
## ..$ hjust              : NULL
## ..$ vjust              : NULL
## ..$ angle              : NULL
## ..$ lineheight         : NULL
## ..$ margin             : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## ..- attr(*, "unit")= int 8
## ..$ debug              : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x          : NULL
## $ strip.text.x.bottom   : NULL
## $ strip.text.x.top      : NULL
## $ strip.text.y          :List of 11
## ..$ family             : NULL
## ..$ face               : NULL
## ..$ colour             : NULL
## ..$ size               : NULL
## ..$ hjust              : NULL
## ..$ vjust              : NULL
## ..$ angle              : num -90
## ..$ lineheight         : NULL
## ..$ margin             : NULL
## ..$ debug              : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.left     :List of 11
## ..$ family             : NULL
## ..$ face               : NULL
## ..$ colour             : NULL
## ..$ size               : NULL
## ..$ hjust              : NULL
## ..$ vjust              : NULL
## ..$ angle              : num 90

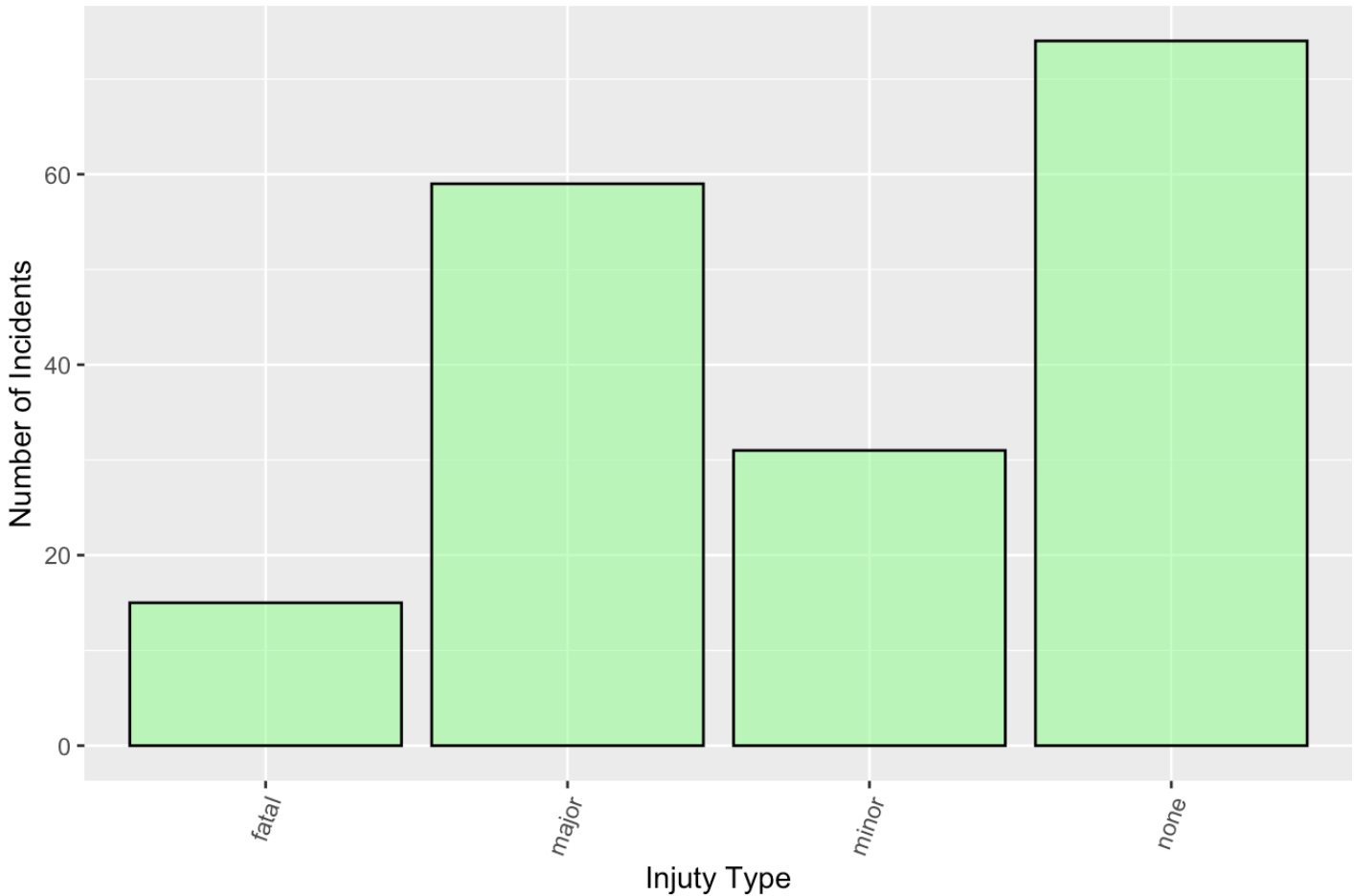
```

```
## ..$ lineheight : NULL
## ..$ margin : NULL
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.right : NULL
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ strip.switch.pad.wrap : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## - attr(*, "class")= chr [1:2] "theme" "gg"
## - attr(*, "complete")= logi TRUE
## - attr(*, "validate")= logi TRUE
```

9. (3 points) Are all incidents involving Great White's fatal? Make a plot that shows the number and types of injuries for Great White's only.

```
sharks %>%
  filter(species=="White") %>%
  ggplot(aes(x=injury))+
  geom_bar(alpha=0.6, fill="palegreen", color="black") +
  labs(title="Injuies Caused by Great Whites",
       x="Injuty Type",
       y="Number of Incidents")+
  theme(plot.title=element_text(size=rel(1.75), hjust = 0.5))+
  theme(axis.text.x = element_text(angle = 70, hjust=1))
```


Injuies Caused by Great Whites



```
theme_light()
```

```
## List of 97
## $ line                               :List of 6
## ..$ colour                          : chr "black"
## ..$ linewidth                       : num 0.5
## ..$ linetype                        : num 1
## ..$ lineend                         : chr "butt"
## ..$ arrow                           : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect                               :List of 5
## ..$ fill                            : chr "white"
## ..$ colour                          : chr "black"
## ..$ linewidth                       : num 0.5
## ..$ linetype                        : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text                               :List of 11
```

```

## ..$ family      : chr ""
## ..$ face        : chr "plain"
## ..$ colour      : chr "black"
## ..$ size        : num 11
## ..$ hjust       : num 0.5
## ..$ vjust       : num 0.5
## ..$ angle       : num 0
## ..$ lineheight  : num 0.9
## ..$ margin      : 'margin' num [1:4] 0points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title         : NULL
## $ aspect.ratio  : NULL
## $ axis.title     : NULL
## $ axis.title.x   :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 2.75points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 0
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 2.75points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom : NULL
## $ axis.title.y       :List of 11
## ..$ family          : NULL

```

```

## ..$ face      : NULL
## ..$ colour    : NULL
## ..$ size      : NULL
## ..$ hjust     : NULL
## ..$ vjust     : num 1
## ..$ angle     : num 90
## ..$ lineheight : NULL
## ..$ margin    : 'margin' num [1:4] 0points 2.75points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug     : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left      : NULL
## $ axis.title.y.right     :List of 11
## ..$ family              : NULL
## ..$ face                 : NULL
## ..$ colour              : NULL
## ..$ size                 : NULL
## ..$ hjust                : NULL
## ..$ vjust                : num 0
## ..$ angle                : num -90
## ..$ lineheight           : NULL
## ..$ margin              : 'margin' num [1:4] 0points 0points 0points 2.75points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                : NULL
## ..$ inherit.blank        : logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text              :List of 11
## ..$ family               : NULL
## ..$ face                  : NULL
## ..$ colour                : chr "grey30"
## ..$ size                  : 'rel' num 0.8
## ..$ hjust                 : NULL
## ..$ vjust                 : NULL
## ..$ angle                 : NULL
## ..$ lineheight            : NULL
## ..$ margin                : NULL
## ..$ debug                 : NULL
## ..$ inherit.blank         : logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x            :List of 11
## ..$ family               : NULL
## ..$ face                  : NULL
## ..$ colour                : NULL
## ..$ size                  : NULL
## ..$ hjust                 : NULL
## ..$ vjust                 : num 1

```

```

## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 2.2points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top      :List of 11
## ..$ family           : NULL
## ..$ face              : NULL
## ..$ colour           : NULL
## ..$ size              : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 0
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 2.2points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom   : NULL
## $ axis.text.y          :List of 11
## ..$ family           : NULL
## ..$ face              : NULL
## ..$ colour           : NULL
## ..$ size              : NULL
## ..$ hjust            : num 1
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 2.2points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.y.left     : NULL
## $ axis.text.y.right    :List of 11
## ..$ family           : NULL
## ..$ face              : NULL
## ..$ colour           : NULL
## ..$ size              : NULL
## ..$ hjust            : num 0
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 0points 2.2points

```

```

## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.ticks :List of 6
## ..$ colour : chr "grey70"
## ..$ linewidth : 'rel' num 0.5
## ..$ linetype : NULL
## ..$ lineend : NULL
## ..$ arrow : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ axis.ticks.x : NULL
## $ axis.ticks.x.top : NULL
## $ axis.ticks.x.bottom : NULL
## $ axis.ticks.y : NULL
## $ axis.ticks.y.left : NULL
## $ axis.ticks.y.right : NULL
## $ axis.ticks.length : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ axis.ticks.length.x : NULL
## $ axis.ticks.length.x.top : NULL
## $ axis.ticks.length.x.bottom: NULL
## $ axis.ticks.length.y : NULL
## $ axis.ticks.length.y.left : NULL
## $ axis.ticks.length.y.right : NULL
## $ axis.line : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ axis.line.x : NULL
## $ axis.line.x.top : NULL
## $ axis.line.x.bottom : NULL
## $ axis.line.y : NULL
## $ axis.line.y.left : NULL
## $ axis.line.y.right : NULL
## $ legend.background :List of 5
## ..$ fill : NULL
## ..$ colour : logi NA
## ..$ linewidth : NULL
## ..$ linetype : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.margin : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ legend.spacing : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ legend.spacing.x : NULL

```

```

## $ legend.spacing.y          : NULL
## $ legend.key                :List of 5
## ..$ fill                    : chr "white"
## ..$ colour                  : logi NA
## ..$ linewidth               : NULL
## ..$ linetype                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.key.size           : 'simpleUnit' num 1.2lines
## ..- attr(*, "unit")= int 3
## $ legend.key.height         : NULL
## $ legend.key.width          : NULL
## $ legend.text               :List of 11
## ..$ family                  : NULL
## ..$ face                    : NULL
## ..$ colour                  : NULL
## ..$ size                    : 'rel' num 0.8
## ..$ hjust                   : NULL
## ..$ vjust                   : NULL
## ..$ angle                   : NULL
## ..$ lineheight              : NULL
## ..$ margin                  : NULL
## ..$ debug                   : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.text.align         : NULL
## $ legend.title              :List of 11
## ..$ family                  : NULL
## ..$ face                    : NULL
## ..$ colour                  : NULL
## ..$ size                    : NULL
## ..$ hjust                   : num 0
## ..$ vjust                   : NULL
## ..$ angle                   : NULL
## ..$ lineheight              : NULL
## ..$ margin                  : NULL
## ..$ debug                   : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align        : NULL
## $ legend.position            : chr "right"
## $ legend.direction           : NULL
## $ legend.justification       : chr "center"
## $ legend.box                 : NULL
## $ legend.box.just            : NULL
## $ legend.box.margin          : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1

```

```

## $ legend.box.background      : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing        : 'simpleUnit' num 11points
##   ..- attr(*, "unit")= int 8
## $ panel.background          :List of 5
##   ..$ fill                  : chr "white"
##   ..$ colour                 : logi NA
##   ..$ linewidth             : NULL
##   ..$ linetype              : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border              :List of 5
##   ..$ fill                  : logi NA
##   ..$ colour                 : chr "grey70"
##   ..$ linewidth             : 'rel' num 1
##   ..$ linetype              : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing             : 'simpleUnit' num 5.5points
##   ..- attr(*, "unit")= int 8
## $ panel.spacing.x           : NULL
## $ panel.spacing.y           : NULL
## $ panel.grid                 :List of 6
##   ..$ colour                 : chr "grey87"
##   ..$ linewidth             : NULL
##   ..$ linetype              : NULL
##   ..$ lineend               : NULL
##   ..$ arrow                 : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major          :List of 6
##   ..$ colour                 : NULL
##   ..$ linewidth             : 'rel' num 0.5
##   ..$ linetype              : NULL
##   ..$ lineend               : NULL
##   ..$ arrow                 : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor          :List of 6
##   ..$ colour                 : NULL
##   ..$ linewidth             : 'rel' num 0.25
##   ..$ linetype              : NULL
##   ..$ lineend               : NULL
##   ..$ arrow                 : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x        : NULL

```

```
## $ panel.grid.major.y      : NULL
## $ panel.grid.minor.x     : NULL
## $ panel.grid.minor.y     : NULL
## $ panel.ontop             : logi FALSE
## $ plot.background        :List of 5
## ..$ fill                 : NULL
## ..$ colour               : chr "white"
## ..$ linewidth            : NULL
## ..$ linetype             : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title              :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : 'rel' num 1.2
## ..$ hjust               : num 0
## ..$ vjust               : num 1
## ..$ angle               : NULL
## ..$ lineheight          : NULL
## ..$ margin              : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug               : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position     : chr "panel"
## $ plot.subtitle           :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : NULL
## ..$ hjust               : num 0
## ..$ vjust               : num 1
## ..$ angle               : NULL
## ..$ lineheight          : NULL
## ..$ margin              : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug               : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption            :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : 'rel' num 0.8
## ..$ hjust               : num 1
## ..$ vjust               : num 1
```



```

## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 5.5points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag           :List of 11
## ..$ family         : NULL
## ..$ face           : NULL
## ..$ colour         : NULL
## ..$ size           : 'rel' num 1.2
## ..$ hjust         : num 0.5
## ..$ vjust         : num 0.5
## ..$ angle         : NULL
## ..$ lineheight     : NULL
## ..$ margin        : NULL
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position : chr "topleft"
## $ plot.margin       : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ strip.background  :List of 5
## ..$ fill           : chr "grey70"
## ..$ colour         : logi NA
## ..$ linewidth      : NULL
## ..$ linetype       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x : NULL
## $ strip.background.y : NULL
## $ strip.clip         : chr "inherit"
## $ strip.placement    : chr "inside"
## $ strip.text         :List of 11
## ..$ family         : NULL
## ..$ face           : NULL
## ..$ colour         : chr "white"
## ..$ size           : 'rel' num 0.8
## ..$ hjust         : NULL
## ..$ vjust         : NULL
## ..$ angle         : NULL
## ..$ lineheight     : NULL
## ..$ margin        : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## .. ..- attr(*, "unit")= int 8

```

```
## ..$ debug          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x      : NULL
## $ strip.text.x.bottom : NULL
## $ strip.text.x.top   : NULL
## $ strip.text.y       :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : num -90
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.left  :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : num 90
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.right : NULL
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ strip.switch.pad.wrap : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## - attr(*, "class")= chr [1:2] "theme" "gg"
## - attr(*, "complete")= logi TRUE
## - attr(*, "validate")= logi TRUE
```

Background

Let's learn a little bit more about Great White sharks by looking at a small dataset that tracked 20 Great White's in the Fallaron Islands. The data (<https://link.springer.com/article/10.1007/s00227-007-0739-4>) are from: Weng et al. (2007) Migration and habitat of white sharks (*Carcharodon carcharias*) in the eastern Pacific

Ocean.

Load the data

```
white_sharks <- read_csv("data/White sharks tracked from Southeast Farallon Island, C
A, USA, 1999 2004.csv", na = c("?", "n/a")) %>% clean_names()
```

10. (1 point) Start by doing some data exploration using your preferred function(s). What is the structure of the data? Where are the missing values and how are they represented?

```
glimpse(white_sharks)
```

```
## Rows: 20
## Columns: 10
## $ shark      <chr> "1-M", "2-M", "3-M", "4-M", "5-F", "6-M", "7-F", "8-M"...
## $ tagging_date <chr> "19-Oct-99", "30-Oct-99", "16-Oct-00", "5-Nov-01", "5-...
## $ total_length_cm <dbl> 402, 366, 457, 457, 488, 427, 442, 380, 450, 530, 427,...
## $ sex        <chr> "M", "M", "M", "M", "F", "M", "F", "M", "M", "F", NA, ...
## $ maturity   <chr> "Mature", "Adolescent", "Mature", "Mature", "Mature", ...
## $ pop_up_date <chr> "2-Nov-99", "25-Nov-99", "16-Apr-01", "6-May-02", "19-...
## $ track_days  <dbl> 14, 26, 182, 182, 256, 275, 35, 60, 209, 91, 182, 240,...
## $ longitude   <dbl> -124.49, -125.97, -156.80, -141.47, -133.25, -138.83, ...
## $ latitude    <dbl> 38.95, 38.69, 20.67, 26.39, 21.13, 26.50, 37.07, 34.93...
## $ comment     <chr> "Nearshore", "Nearshore", "To Hawaii", "To Hawaii", "O..."
```

```
white_sharks %>% naniar::miss_var_summary()
```

```
## # A tibble: 10 × 3
##   variable      n_miss pct_miss
##   <chr>         <int>    <dbl>
## 1 sex           3        15
## 2 maturity      1         5
## 3 longitude     1         5
## 4 latitude      1         5
## 5 shark         0         0
## 6 tagging_date  0         0
## 7 total_length_cm 0         0
## 8 pop_up_date    0         0
## 9 track_days     0         0
## 10 comment       0         0
```

11. (3 points) How do male and female sharks compare in terms of total length? Are males or females larger on average? Do a quick search online to verify your findings. (hint: this is a table, not a plot). ##### Males

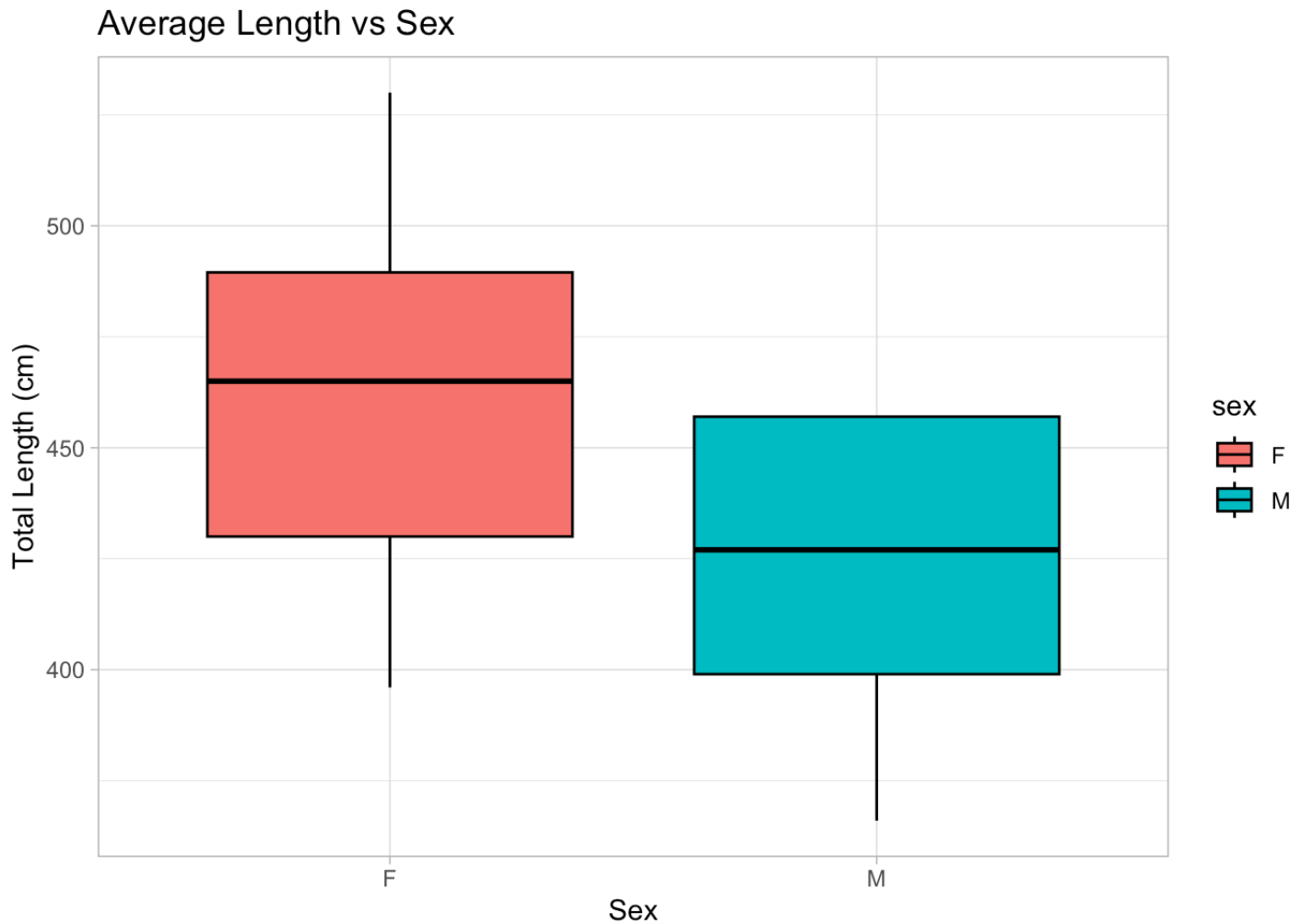
are smaller than females on average because they need more space to carry eggs

```
white_sharks %>%
  select(sex, total_length_cm) %>%
  filter(sex!="NA") %>%
  group_by(sex) %>%
  summarize(mean_length_cm=mean(total_length_cm))
```

```
## # A tibble: 2 × 2
##   sex   mean_length_cm
##   <chr>         <dbl>
## 1 F             462
## 2 M             425.
```

12. (3 points) Make a plot that compares the range of total length by sex.

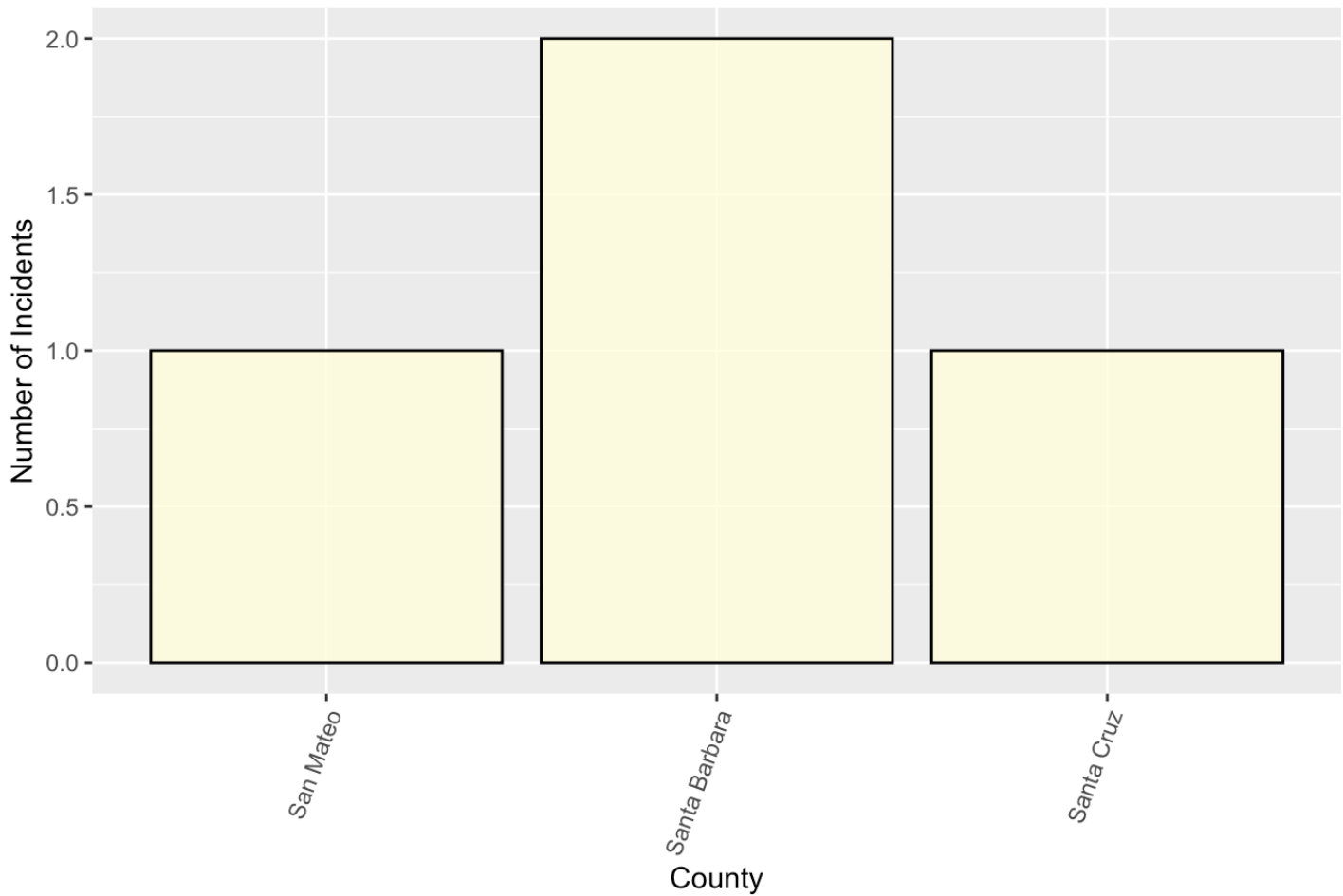
```
white_sharks %>%
  select(sex, total_length_cm) %>%
  filter(sex!="NA") %>%
  ggplot(aes(x=sex, y=total_length_cm, fill=sex))+
  geom_boxplot(color="black") +
  labs(title="Average Length vs Sex",
        x="Sex",
        y="Total Length (cm)") +
  theme(plot.title=element_text(size=rel(2), hjust = 0.5)) +
  theme_light()
```



13. (2 points) Using the `sharks` or the `white_sharks` data, what is one question that you are interested in exploring? Write the question and answer it using a plot or table. #####What top 3 counties has the most incidents in 2004?

```
sharks %>%
  select(year, county) %>%
  filter(year=="2017") %>%
  top_n(4, county) %>%
  ggplot(aes(x=county))+
  geom_bar(alpha=0.9, fill="lightyellow", color="black") +
  labs(title="Top 3 Number of Incidents Per County in 2017",
       x="County",
       y="Number of Incidents")+
  theme(plot.title=element_text(size=rel(1.5), hjust = 0.5))+
  theme(axis.text.x = element_text(angle = 70, hjust=1))
```

Top 3 Number of Incidents Per County in 2017



```
theme_light()
```

```
## List of 97
## $ line                                :List of 6
## ..$ colour                          : chr "black"
## ..$ linewidth                       : num 0.5
## ..$ linetype                        : num 1
## ..$ lineend                         : chr "butt"
## ..$ arrow                          : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect                               :List of 5
## ..$ fill                            : chr "white"
## ..$ colour                          : chr "black"
## ..$ linewidth                       : num 0.5
## ..$ linetype                        : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text                               :List of 11
```

```

## ..$ family      : chr ""
## ..$ face        : chr "plain"
## ..$ colour      : chr "black"
## ..$ size        : num 11
## ..$ hjust       : num 0.5
## ..$ vjust       : num 0.5
## ..$ angle       : num 0
## ..$ lineheight  : num 0.9
## ..$ margin      : 'margin' num [1:4] 0points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title         : NULL
## $ aspect.ratio  : NULL
## $ axis.title     : NULL
## $ axis.title.x   :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 2.75points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 0
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 2.75points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom : NULL
## $ axis.title.y       :List of 11
## ..$ family          : NULL

```

```

## ..$ face      : NULL
## ..$ colour    : NULL
## ..$ size      : NULL
## ..$ hjust     : NULL
## ..$ vjust     : num 1
## ..$ angle     : num 90
## ..$ lineheight : NULL
## ..$ margin    : 'margin' num [1:4] 0points 2.75points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug     : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left      : NULL
## $ axis.title.y.right    :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 0
## ..$ angle       : num -90
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 0points 2.75points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text          :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : chr "grey30"
## ..$ size          : 'rel' num 0.8
## ..$ hjust         : NULL
## ..$ vjust         : NULL
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : NULL
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x        :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : NULL
## ..$ size          : NULL
## ..$ hjust         : NULL
## ..$ vjust         : num 1

```



```

## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 2.2points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top      :List of 11
## ..$ family           : NULL
## ..$ face              : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust             : NULL
## ..$ vjust             : num 0
## ..$ angle            : NULL
## ..$ lineheight        : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 2.2points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom   : NULL
## $ axis.text.y          :List of 11
## ..$ family           : NULL
## ..$ face              : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust             : num 1
## ..$ vjust             : NULL
## ..$ angle            : NULL
## ..$ lineheight        : NULL
## ..$ margin           : 'margin' num [1:4] 0points 2.2points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.y.left     : NULL
## $ axis.text.y.right    :List of 11
## ..$ family           : NULL
## ..$ face              : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust             : num 0
## ..$ vjust             : NULL
## ..$ angle            : NULL
## ..$ lineheight        : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 0points 2.2points

```

```

## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.ticks :List of 6
## ..$ colour : chr "grey70"
## ..$ linewidth : 'rel' num 0.5
## ..$ linetype : NULL
## ..$ lineend : NULL
## ..$ arrow : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ axis.ticks.x : NULL
## $ axis.ticks.x.top : NULL
## $ axis.ticks.x.bottom : NULL
## $ axis.ticks.y : NULL
## $ axis.ticks.y.left : NULL
## $ axis.ticks.y.right : NULL
## $ axis.ticks.length : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ axis.ticks.length.x : NULL
## $ axis.ticks.length.x.top : NULL
## $ axis.ticks.length.x.bottom: NULL
## $ axis.ticks.length.y : NULL
## $ axis.ticks.length.y.left : NULL
## $ axis.ticks.length.y.right : NULL
## $ axis.line : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ axis.line.x : NULL
## $ axis.line.x.top : NULL
## $ axis.line.x.bottom : NULL
## $ axis.line.y : NULL
## $ axis.line.y.left : NULL
## $ axis.line.y.right : NULL
## $ legend.background :List of 5
## ..$ fill : NULL
## ..$ colour : logi NA
## ..$ linewidth : NULL
## ..$ linetype : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.margin : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ legend.spacing : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ legend.spacing.x : NULL

```

```

## $ legend.spacing.y          : NULL
## $ legend.key                :List of 5
## ..$ fill                    : chr "white"
## ..$ colour                  : logi NA
## ..$ linewidth               : NULL
## ..$ linetype                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.key.size           : 'simpleUnit' num 1.2lines
## ..- attr(*, "unit")= int 3
## $ legend.key.height         : NULL
## $ legend.key.width          : NULL
## $ legend.text               :List of 11
## ..$ family                  : NULL
## ..$ face                    : NULL
## ..$ colour                  : NULL
## ..$ size                    : 'rel' num 0.8
## ..$ hjust                   : NULL
## ..$ vjust                   : NULL
## ..$ angle                   : NULL
## ..$ lineheight              : NULL
## ..$ margin                  : NULL
## ..$ debug                   : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.text.align         : NULL
## $ legend.title              :List of 11
## ..$ family                  : NULL
## ..$ face                    : NULL
## ..$ colour                  : NULL
## ..$ size                    : NULL
## ..$ hjust                   : num 0
## ..$ vjust                   : NULL
## ..$ angle                   : NULL
## ..$ lineheight              : NULL
## ..$ margin                  : NULL
## ..$ debug                   : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align        : NULL
## $ legend.position            : chr "right"
## $ legend.direction           : NULL
## $ legend.justification       : chr "center"
## $ legend.box                 : NULL
## $ legend.box.just            : NULL
## $ legend.box.margin          : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1

```

```
## $ legend.box.background      : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing        : 'simpleUnit' num 11points
##   ..- attr(*, "unit")= int 8
## $ panel.background          :List of 5
##   ..$ fill                  : chr "white"
##   ..$ colour                : logi NA
##   ..$ linewidth            : NULL
##   ..$ linetype              : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border              :List of 5
##   ..$ fill                  : logi NA
##   ..$ colour                : chr "grey70"
##   ..$ linewidth            : 'rel' num 1
##   ..$ linetype              : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing             : 'simpleUnit' num 5.5points
##   ..- attr(*, "unit")= int 8
## $ panel.spacing.x           : NULL
## $ panel.spacing.y           : NULL
## $ panel.grid                 :List of 6
##   ..$ colour                : chr "grey87"
##   ..$ linewidth            : NULL
##   ..$ linetype              : NULL
##   ..$ lineend              : NULL
##   ..$ arrow                 : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major          :List of 6
##   ..$ colour                : NULL
##   ..$ linewidth            : 'rel' num 0.5
##   ..$ linetype              : NULL
##   ..$ lineend              : NULL
##   ..$ arrow                 : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor          :List of 6
##   ..$ colour                : NULL
##   ..$ linewidth            : 'rel' num 0.25
##   ..$ linetype              : NULL
##   ..$ lineend              : NULL
##   ..$ arrow                 : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x        : NULL
```

```
## $ panel.grid.major.y      : NULL
## $ panel.grid.minor.x     : NULL
## $ panel.grid.minor.y     : NULL
## $ panel.ontop             : logi FALSE
## $ plot.background        :List of 5
## ..$ fill                 : NULL
## ..$ colour               : chr "white"
## ..$ linewidth            : NULL
## ..$ linetype             : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title              :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : 'rel' num 1.2
## ..$ hjust                : num 0
## ..$ vjust                : num 1
## ..$ angle                : NULL
## ..$ lineheight           : NULL
## ..$ margin               : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position     : chr "panel"
## $ plot.subtitle           :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : NULL
## ..$ hjust                : num 0
## ..$ vjust                : num 1
## ..$ angle                : NULL
## ..$ lineheight           : NULL
## ..$ margin               : 'margin' num [1:4] 0points 0points 5.5points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption            :List of 11
## ..$ family               : NULL
## ..$ face                 : NULL
## ..$ colour               : NULL
## ..$ size                 : 'rel' num 0.8
## ..$ hjust                : num 1
## ..$ vjust                : num 1
```

```

## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 5.5points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag           :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : NULL
## ..$ size          : 'rel' num 1.2
## ..$ hjust         : num 0.5
## ..$ vjust         : num 0.5
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : NULL
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position : chr "topleft"
## $ plot.margin       : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ strip.background  :List of 5
## ..$ fill           : chr "grey70"
## ..$ colour         : logi NA
## ..$ linewidth      : NULL
## ..$ linetype       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x : NULL
## $ strip.background.y : NULL
## $ strip.clip         : chr "inherit"
## $ strip.placement    : chr "inside"
## $ strip.text         :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : chr "white"
## ..$ size          : 'rel' num 0.8
## ..$ hjust         : NULL
## ..$ vjust         : NULL
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## ..- attr(*, "unit")= int 8

```

```

## ..$ debug          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x      : NULL
## $ strip.text.x.bottom : NULL
## $ strip.text.x.top   : NULL
## $ strip.text.y       :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : num -90
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.left   :List of 11
## ..$ family          : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : num 90
## ..$ lineheight       : NULL
## ..$ margin           : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.y.right  : NULL
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ strip.switch.pad.wrap : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## - attr(*, "class")= chr [1:2] "theme" "gg"
## - attr(*, "complete")= logi TRUE
## - attr(*, "validate")= logi TRUE

```