Untitled

```
# install.packages("dataRetrieval")
library(dataRetrieval) # for getting USGS NWIS data
# install.packages("tidyhydat")
library(tidyhydat) # for getting ECCC HYDAT data
# download_hydat()
library(dplyr) # for data wrangling and pipelines
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(ggplot2) # for modifying fasstr plots
library("dplyr")
#install.packages('corrplot')
library(corrplot)
```

```
## corrplot 0.92 loaded
```

```
library(RColorBrewer)
# install.packages("gbm")
library("gbm")
```

```
## Loaded gbm 2.1.8
```

```
# install.packages("caret")
library("caret")
```

```
## Loading required package: lattice
```

```
#install.packages("pdp")
library("pdp")          # model visualization
library("ggplot2")      # model visualization
#install.packages("lime")
library("lime")         # model visualization
```

```
##
## Attaching package: 'lime'
```

```
## The following object is masked from 'package:dplyr':
##
##     explain
```

```
library("pROC")
```

```
## Type 'citation("pROC")' for a citation.
```

```
##
## Attaching package: 'pROC'

## The following objects are masked from 'package:stats':
##
##     cov, smooth, var
```

```
#install.packages("e1071", repos="http://R-Forge.R-project.org")
library("e1071")
library( "MASS" )    #    used to generate correlated variables
```

```
##
## Attaching package: 'MASS'

## The following object is masked from 'package:dplyr':
##
##     select
```

```
library("sp")
library("Hmisc")    #   used for graphing se bars
```

```
## Loading required package: survival

##
## Attaching package: 'survival'

## The following object is masked from 'package:caret':
##
##     cluster

## Loading required package: Formula

##
## Attaching package: 'Hmisc'

## The following object is masked from 'package:e1071':
##
##     impute

## The following objects are masked from 'package:dplyr':
##
##     src, summarize

## The following objects are masked from 'package:base':
##
##     format.pval, units
```

```
#install.packages("randomForest")
require("randomForest")
```

```
## Loading required package: randomForest

## randomForest 4.7-1.1

## Type rfNews() to see new features/changes/bug fixes.

##
## Attaching package: 'randomForest'

## The following object is masked from 'package:ggplot2':
##
##     margin
```

```
## The following object is masked from 'package:dplyr':
##
##     combine
```

```
#install.packages("e1071")
library(e1071)
library(caret)
library("ModelMetrics")
```

```
##
## Attaching package: 'ModelMetrics'
```

```
## The following object is masked from 'package:pROC':
##
##     auc
```

```
## The following objects are masked from 'package:caret':
##
##     confusionMatrix, precision, recall, sensitivity, specificity
```

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

```
library("foreign")
library(rvest)
```

https://www.usbr.gov/pn-bin/inventory.pl?site=LUC&ui=true&interval=daily

```
lucky <- as.data.frame(read_html("https://www.usbr.gov/pn-bin/daily.pl?station=luc&format=html&year=202
lucky
```

```
##      DateTime  luc_id   luc_qu  luc_fb luc_qrd  luc_qt luc_xqd luc_qsd   luc_af
## 1  2022-06-01 3082.51  6204.82 3035.45    0.25 3044.92 3044.12   25.31 213413.9
## 2  2022-06-02 3484.95  6373.82 3035.79    0.25 3060.07 3060.45   23.05 214256.1
## 3  2022-06-03 4044.52  6152.45 3036.58    0.23 3055.06 3054.30   26.30 216218.2
## 4  2022-06-04 4069.23  7442.10 3037.39    0.24 3050.80 3049.47   24.76 218237.7
## 5  2022-06-05 4104.38  8088.31 3038.23    0.25 3043.25 3040.92   24.24 220342.0
## 6  2022-06-06 5538.42  8661.23 3040.19    0.25 3044.11 3044.35   22.85 225288.9
## 7  2022-06-07 7033.54  8072.12 3043.31    0.25 3008.88 3010.32   22.15 233271.1
## 8  2022-06-08 6924.95  7727.58 3046.26    0.25 3058.31 3060.04   23.13 240940.0
## 9  2022-06-09 6898.45  7155.07 3048.88    0.25 3415.08 3413.48   27.22 247848.7
## 10 2022-06-10 5266.44  7592.16 3049.99    0.25 3776.22 3773.66   26.66 250804.0
## 11 2022-06-11 3791.06  8718.79 3049.93    0.25 3871.55 3871.08   24.49 250643.8
## 12 2022-06-12 4724.57  9694.65 3050.56    0.25 3873.62 3870.93   29.53 252331.2
## 13 2022-06-13 5978.41 10468.02 3051.44    0.25 4786.47 4778.07   34.70 254694.8
## 14 2022-06-14 6247.38  7944.91 3052.08    0.25 5377.76 5376.74   35.53 256419.2
## 15 2022-06-15 6088.89  6448.86 3052.60    0.25 5378.73 5379.58   33.80 257827.3
## 16 2022-06-16 5338.11  5765.65 3052.92    0.25 4900.99 4907.97   33.71 258693.8
## 17 2022-06-17 4870.96  6036.59 3053.34    0.25 4294.72 4292.39   32.29 259836.2
## 18 2022-06-18 3732.77  6570.22 3053.05    0.25 4130.36 4128.80   30.05 259047.1
## 19 2022-06-19 4286.62  6290.68 3053.17    0.25 4121.67 4120.79   28.85 259373.8
## 20 2022-06-20 4095.71  5496.28 3053.08    0.25 4219.26 4218.35   30.46 259128.2
## 21 2022-06-21 4214.03  4898.69 3052.99    0.25 4336.92 4331.10   36.58 258884.0
## 22 2022-06-22 4494.36  4723.25 3053.21    0.25 4192.14 4190.11   33.51 259482.9
## 23 2022-06-23 4969.99  4719.92 3053.82    0.25 4132.66 4134.54   32.22 261143.2
## 24 2022-06-24 4540.06  4886.42 3054.05    0.25 4223.21 4220.03   28.24 261771.1
## 25 2022-06-25 4318.47  4574.08 3054.10    0.25 4249.58 4250.44   25.23 261907.3
```

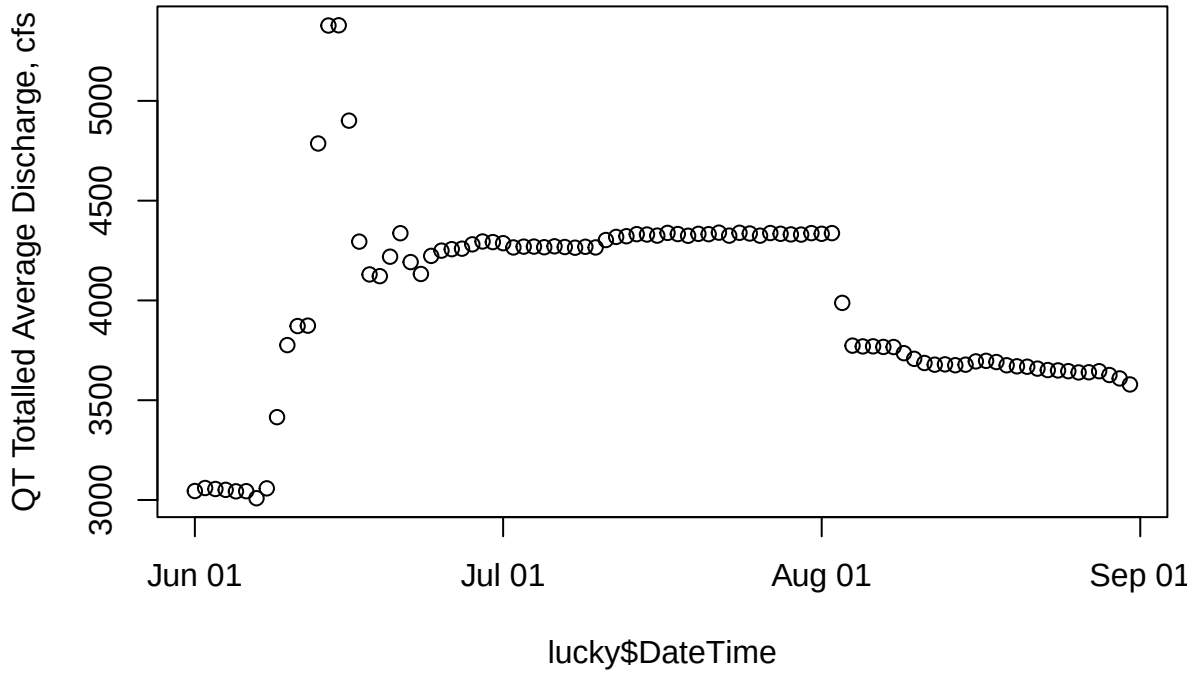
```
## 26 2022-06-26 4312.25  4223.01 3054.14    0.25 4256.83 4257.57   24.90 262016.7
## 27 2022-06-27 4149.43  4015.33 3054.06    0.25 4259.36 4255.04   26.99 261798.2
## 28 2022-06-28 4102.15  3894.43 3053.93    0.25 4281.04 4279.93   29.19 261442.8
## 29 2022-06-29 4240.69  3772.83 3053.89    0.25 4295.45 4295.59   29.11 261333.7
## 30 2022-06-30 4224.42  3491.36 3053.84    0.25 4292.46 4292.07   28.90 261198.2
## 31 2022-07-01 4204.96  3214.78 3053.78    0.25 4286.97 4283.53   31.63 261035.1
## 32 2022-07-02 4279.50  3039.25 3053.79    0.25 4265.62 4263.72   28.04 261062.1
## 33 2022-07-03 4365.75  2870.39 3053.86    0.25 4269.61 4270.69   26.61 261252.3
## 34 2022-07-04 4393.88  2710.97 3053.95    0.25 4269.82 4268.01   28.42 261497.9
## 35 2022-07-05 4349.14  2590.61 3054.01    0.25 4266.63 4263.98   27.57 261661.0
## 36 2022-07-06 4285.60  2372.79 3054.02    0.25 4271.21 4270.93   26.86 261689.0
## 37 2022-07-07 4295.73  2283.60 3054.04    0.25 4267.73 4267.04   28.27 261744.1
## 38 2022-07-08 4512.44  2182.18 3054.22    0.25 4264.22 4263.86   25.80 262235.9
## 39 2022-07-09 4503.45  2012.36 3054.39    0.25 4268.86 4266.23   30.69 262700.7
## 40 2022-07-10 4293.61  1943.69 3054.41    0.25 4265.60 4265.76   28.30 262755.8
## 41 2022-07-11 4247.83  1861.10 3054.37    0.25 4302.75 4301.97   27.14 262646.3
## 42 2022-07-12 4332.39  1669.38 3054.38    0.25 4318.35 4316.22   28.43 262673.7
## 43 2022-07-13 4432.54  1573.41 3054.46    0.25 4321.77 4322.90   26.57 262892.9
## 44 2022-07-14 4429.24  1641.20 3054.53    0.25 4332.09 4330.61   31.95 263085.1
## 45 2022-07-15 4371.50  1494.73 3054.56    0.25 4330.36 4331.91   26.22 263166.2
## 46 2022-07-16 4325.11  1492.70 3054.56    0.25 4324.85 4324.32   29.29 263166.2
## 47 2022-07-17 4242.23  1406.29 3054.49    0.25 4338.37 4337.92   29.49 262975.0
## 48 2022-07-18 4291.57  1396.64 3054.46    0.25 4332.69 4331.68   28.93 262892.9
## 49 2022-07-19 4614.20  1571.05 3054.67    0.25 4324.11 4325.44   28.88 263467.8
## 50 2022-07-20 4292.15  1210.18 3054.64    0.25 4333.77 4332.95   29.54 263384.7
## 51 2022-07-21 4263.50  1224.38 3054.59    0.25 4332.04 4332.86   29.76 263248.2
## 52 2022-07-22 4216.39  1164.66 3054.50    0.25 4339.78 4338.34   32.05 263003.0
## 53 2022-07-23 4186.72  1110.29 3054.40    0.25 4324.75 4327.22   28.26 262728.7
## 54 2022-07-24 4339.34  1085.45 3054.40    0.25 4339.08 4334.39   31.52 262728.7
## 55 2022-07-25 4377.08  1102.01 3054.43    0.25 4335.44 4333.62   30.91 262810.8
## 56 2022-07-26 4352.65   994.40 3054.45    0.25 4324.57 4324.09   26.44 262866.0
## 57 2022-07-27 4351.61  1049.32 3054.46    0.25 4337.80 4335.18   32.95 262892.9
## 58 2022-07-28 4278.75  1105.02 3054.42    0.25 4334.00 4331.57   30.83 262782.8
## 59 2022-07-29 4289.83  1007.20 3054.39    0.25 4330.94 4333.81   25.51 262700.7
## 60 2022-07-30 4289.19   929.42 3054.36    0.24 4330.00 4331.65   30.31 262619.3
## 61 2022-07-31 4378.44   975.32 3054.39    0.11 4337.28 4334.23   27.90 262700.7
## 62 2022-08-01 4320.52   886.13 3054.38    0.20 4333.95 4333.59   31.09 262673.7
## 63 2022-08-02 4310.16   977.62 3054.36    0.25 4337.32 4332.42   29.71 262619.3
## 64 2022-08-03 3932.50   947.83 3054.32    0.25 3987.75 3994.66   24.91 262509.2
## 65 2022-08-04 3636.02   981.07 3054.22    0.25 3773.54 3774.93   25.08 262235.9
## 66 2022-08-05 3397.73   824.46 3053.95    0.25 3769.58 3768.45   27.66 261497.9
## 67 2022-08-06 3111.35   828.99 3053.47    0.25 3770.02 3769.30   26.05 260190.9
## 68 2022-08-07 3094.61   824.34 3052.98    0.25 3766.90 3768.69   26.30 258857.0
## 69 2022-08-08 3001.91   815.34 3052.42    0.25 3766.56 3765.94   22.81 257339.8
## 70 2022-08-09 3367.44   702.41 3052.15    0.25 3735.76 3734.94   23.15 256608.7
## 71 2022-08-10 3748.48   930.19 3052.18    0.25 3707.35 3707.32   23.69 256689.8
## 72 2022-08-11 3686.74   917.86 3052.18    0.25 3686.48 3686.31   23.75 256689.8
## 73 2022-08-12 3541.85   785.07 3052.08    0.25 3678.03 3678.92   25.92 256419.2
## 74 2022-08-13 3489.21   890.23 3051.94    0.25 3679.72 3680.91   25.91 256040.8
## 75 2022-08-14 3404.37   733.80 3051.74    0.25 3675.29 3675.61   23.36 255503.0
## 76 2022-08-15 1998.44   749.12 3050.50    0.25 3678.06 3679.07   23.75 252171.0
## 77 2022-08-16 1248.53   796.80 3048.68    0.25 3694.59 3697.14   26.47 247318.8
## 78 2022-08-17 1089.64   749.83 3046.72    0.25 3697.39 3697.04   24.57 242145.9
## 79 2022-08-18 1018.39   784.46 3044.69    0.25 3691.27 3690.79   26.06 236843.9
```

```
## 80 2022-08-19 1069.23   755.64 3042.69    0.25 3675.02 3674.06   23.74 231674.9
## 81 2022-08-20 1103.93   934.53 3040.70    0.25 3669.87 3668.12   28.19 226584.9
## 82 2022-08-21 1116.43   825.02 3038.70    0.25 3667.77 3669.46   23.73 221523.9
## 83 2022-08-22  770.14   891.14 3036.41    0.25 3658.31 3661.00   23.32 215794.8
## 84 2022-08-23  587.97   889.46 3033.95    0.25 3650.99 3651.79   24.19 209718.9
## 85 2022-08-24  298.37   720.86 3031.22    0.25 3649.28 3648.48   26.81 203071.9
## 86 2022-08-25  154.45   751.38 3028.33    0.25 3645.43 3640.54   26.67 196147.2
## 87 2022-08-26  169.57   727.68 3025.41    0.25 3639.19 3641.22   25.18 189264.8
## 88 2022-08-27  147.34   670.67 3022.42    0.25 3639.95 3640.23   25.05 182336.8
## 89 2022-08-28  164.83   691.18 3019.39    0.25 3645.39 3643.76   26.14 175432.8
## 90 2022-08-29  181.19   542.18 3016.34    0.25 3626.19 3627.55   23.49 168599.2
## 91 2022-08-30  378.02   676.48 3013.43    0.25 3609.15 3609.54   23.54 162189.9
## 92 2022-08-31  499.99   705.69 3010.61    0.25 3579.00 3580.16   23.49 156082.2
##     luc_qd
## 1  3045.17
## 2  3060.33
## 3  3055.30
## 4  3051.04
## 5  3043.50
## 6  3044.36
## 7  3009.13
## 8  3058.56
## 9  3415.34
## 10 3776.48
## 11 3871.80
## 12 3873.87
## 13 4786.72
## 14 5378.01
## 15 5378.99
## 16 4901.24
## 17 4294.97
## 18 4130.62
## 19 4121.93
## 20 4219.51
## 21 4337.17
## 22 4192.41
## 23 4132.92
## 24 4223.47
## 25 4249.83
## 26 4257.08
## 27 4259.61
## 28 4281.30
## 29 4295.70
## 30 4292.72
## 31 4287.22
## 32 4265.87
## 33 4269.86
## 34 4270.07
## 35 4266.88
## 36 4271.47
## 37 4267.98
## 38 4264.48
## 39 4269.12
## 40 4265.85
```

```
## 41 4303.00
## 42 4318.60
## 43 4322.02
## 44 4332.34
## 45 4330.62
## 46 4325.11
## 47 4338.62
## 48 4332.95
## 49 4324.36
## 50 4334.03
## 51 4332.30
## 52 4340.03
## 53 4325.00
## 54 4339.34
## 55 4335.69
## 56 4324.83
## 57 4338.05
## 58 4334.26
## 59 4331.21
## 60 4330.24
## 61 4337.39
## 62 4334.15
## 63 4337.58
## 64 3988.01
## 65 3773.79
## 66 3769.83
## 67 3770.27
## 68 3767.15
## 69 3766.81
## 70 3736.01
## 71 3707.60
## 72 3686.74
## 73 3678.28
## 74 3679.97
## 75 3675.55
## 76 3678.31
## 77 3694.84
## 78 3697.64
## 79 3691.52
## 80 3675.27
## 81 3670.13
## 82 3668.02
## 83 3658.56
## 84 3651.24
## 85 3649.54
## 86 3645.68
## 87 3639.44
## 88 3640.20
## 89 3645.64
## 90 3626.44
## 91 3609.40
## 92 3579.25
```

```
save(lucky,file="lucky.Rdata")
```

```
lucky$DateTime<-as.Date(lucky$DateTime,format="%Y-%m-%d")
plot(lucky$DateTime,lucky$luc_qt,ylab = "QT Totalled Average Discharge, cfs")
```




```
usgs<-load("Boise_daily_df_summer.Rdata")
head(usgs)
```

```
## [1] "daily_df_summer"
```

```
daily_df_summer
```

```
##           date max_AirTemperature_C mean_StreamTemp log_median_Q mo   yr doy
## 198 2016-06-01                 33.3            13.6     7.811973  6 2016 153
## 199 2016-06-02                 28.3            13.7     7.791523  6 2016 154
## 200 2016-06-03                 30.6            13.9     7.766417  6 2016 155
## 201 2016-06-04                 33.9            14.6     7.766417  6 2016 156
## 202 2016-06-05                 36.1            14.8     7.762171  6 2016 157
## 203 2016-06-06                 35.0            15.1     7.766417  6 2016 158
## 204 2016-06-07                 35.0            14.8     7.753624  6 2016 159
## 205 2016-06-08                 38.3            15.0     7.736307  6 2016 160
## 206 2016-06-09                 28.9            14.9     7.718685  6 2016 161
## 207 2016-06-10                 28.3            14.5     7.745003  6 2016 162
## 208 2016-06-11                 22.2            13.8     7.757906  6 2016 163
## 209 2016-06-12                 26.1            13.5     7.774856  6 2016 164
## 210 2016-06-13                 30.6            14.0     7.791523  6 2016 165
## 211 2016-06-14                 20.0            13.9     7.774856  6 2016 166
## 212 2016-06-15                 16.7            12.7     7.663877  6 2016 167
## 213 2016-06-16                 19.4            12.9     7.700748  6 2016 168
## 214 2016-06-17                 27.8            14.0     7.668561  6 2016 169
## 215 2016-06-18                 27.8            15.1     7.467371  6 2016 170
## 216 2016-06-19                 26.7            14.7     7.432484  6 2016 171
## 217 2016-06-20                 35.0            15.6     7.420579  6 2016 172
```

```
## 218  2016-06-21          28.3          16.4     7.319865  6 2016 173
## 219  2016-06-22          33.9          16.8     6.984716  6 2016 174
## 220  2016-06-23          31.7          17.9     6.744059  6 2016 175
## 221  2016-06-24          22.8          17.9     6.677083  6 2016 176
## 222  2016-06-25          27.2          16.8     6.729824  6 2016 177
## 223  2016-06-26          33.9          17.3     6.736967  6 2016 178
## 224  2016-06-27          38.3          18.4     6.680855  6 2016 179
## 225  2016-06-28          37.8          19.1     6.575076  6 2016 180
## 226  2016-06-29          38.9          19.4     6.569481  6 2016 181
## 227  2016-06-30          36.1          19.7     6.536692  6 2016 182
## 228  2016-07-01          34.4          19.6     6.519147  7 2016 183
## 229  2016-07-02          35.6          19.0     6.555357  7 2016 184
## 230  2016-07-03          33.9          19.3     6.562444  7 2016 185
## 231  2016-07-04          30.0          19.0     6.622736  7 2016 186
## 232  2016-07-05          28.9          18.2     6.641182  7 2016 187
## 233  2016-07-06          26.1          17.7     6.588926  7 2016 188
## 234  2016-07-07          32.8          17.5     6.643790  7 2016 189
## 235  2016-07-08          32.2          18.3     6.639876  7 2016 190
## 236  2016-07-09          30.0          18.4     6.432940  7 2016 191
## 237  2016-07-10          20.6          16.7     6.655440  7 2016 192
## 238  2016-07-11          23.3          15.9     6.927558  7 2016 193
## 239  2016-07-12          28.9          17.7     6.742881  7 2016 194
## 240  2016-07-13          28.3          18.4     6.498282  7 2016 195
## 241  2016-07-14          33.3          19.1     6.253829  7 2016 196
## 242  2016-07-15          32.2          19.7     6.045005  7 2016 197
## 243  2016-07-16          28.9          19.2     6.037871  7 2016 198
## 244  2016-07-17          35.0          19.2     6.018593  7 2016 199
## 245  2016-07-18          35.6          19.9     6.006353  7 2016 200
## 246  2016-07-19          33.9          20.1     5.768321  7 2016 201
## 247  2016-07-20          32.8          20.0     5.866468  7 2016 202
## 248  2016-07-21          37.8          20.3     5.913503  7 2016 203
## 249  2016-07-22          32.2          20.5     5.921578  7 2016 204
## 250  2016-07-23          30.0          19.8     5.855072  7 2016 205
## 251  2016-07-24          33.9          19.6     5.973810  7 2016 206
## 252  2016-07-25          37.8          19.9     5.986452  7 2016 207
## 253  2016-07-26          37.2          20.6     5.700444  7 2016 208
## 254  2016-07-27          38.3          21.0     5.564520  7 2016 209
## 255  2016-07-28          37.2          21.5     5.433722  7 2016 210
## 256  2016-07-29          37.8          21.5     5.549076  7 2016 211
## 257  2016-07-30          37.8          21.6     5.713733  7 2016 212
## 258  2016-07-31          33.3          20.9     5.645447  7 2016 213
## 259  2016-08-01          34.4          20.1     5.765191  8 2016 214
## 260  2016-08-02          35.6          20.1     5.749393  8 2016 215
## 261  2016-08-03          27.2          19.3     5.579730  8 2016 216
## 262  2016-08-04          32.2          19.2     5.733341  8 2016 217
## 263  2016-08-05          36.1          19.8     5.855072  8 2016 218
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## 266  2016-08-08          29.4          19.7     6.093570  8 2016 221
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## 268  2016-08-10          26.7          18.4     6.084499  8 2016 223
## 269  2016-08-11          30.6          18.6     6.159095  8 2016 224
## 270  2016-08-12          33.3          19.4     6.056784  8 2016 225
## 271  2016-08-13          35.6          19.8     6.035481  8 2016 226
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## 1316 2019-08-19          35.0          20.4     6.248043  8 2019 231
## 1317 2019-08-20          36.7          20.8     6.131226  8 2019 232
## 1318 2019-08-21          36.1          20.9     6.086775  8 2019 233
## 1319 2019-08-22          28.3          20.5     6.113682  8 2019 234
## 1320 2019-08-23          30.6          19.9     6.190315  8 2019 235
## 1321 2019-08-24          35.0          20.1     6.261492  8 2019 236
## 1322 2019-08-25          30.0          20.1     6.285998  8 2019 237
## 1323 2019-08-26          28.3          19.3     6.326149  8 2019 238
## 1324 2019-08-27          31.7          19.0     6.251904  8 2019 239
## 1325 2019-08-28          36.1          19.2     6.265301  8 2019 240
## 1326 2019-08-29          35.0          20.1     6.308098  8 2019 241
## 1327 2019-08-30          33.3          20.5     6.326149  8 2019 242
## 1328 2019-08-31          35.6          20.7     6.347389  8 2019 243
## 1589 2020-08-12          30.0          20.3     5.963579  8 2020 225
## 1590 2020-08-13          32.2          19.6     5.924256  8 2020 226
## 1591 2020-08-14          31.7          19.6     5.966147  8 2020 227
## 1592 2020-08-15          36.7          19.7     6.025866  8 2020 228
## 1593 2020-08-16          39.4          20.1     6.077642  8 2020 229
## 1594 2020-08-17          38.9          20.8     6.102559  8 2020 230
## 1595 2020-08-18          38.3          21.5     6.073045  8 2020 231
## 1596 2020-08-19          35.0          21.5     6.045005  8 2020 232
## 1597 2020-08-20          32.8          20.8     6.095825  8 2020 233
## 1598 2020-08-21          33.3          20.0     6.152733  8 2020 234
## 1599 2020-08-22          32.2          19.7     6.208590  8 2020 235
## 1600 2020-08-23          33.9          19.9     6.242223  8 2020 236
## 1601 2020-08-24          32.2          19.8     6.324359  8 2020 237
## 1602 2020-08-25          34.4          20.1     6.315358  8 2020 238
## 1603 2020-08-26          32.8          20.7     6.326149  8 2020 239
## 1604 2020-08-27          31.1          20.7     6.364751  8 2020 240
## 1605 2020-08-28          32.2          20.1     6.361302  8 2020 241
## 1606 2020-08-29          33.9          19.8     6.343880  8 2020 242
## 1607 2020-08-30          26.1          19.0     6.336826  8 2020 243
## 1608 2020-08-31          24.4          17.7     6.416732  8 2020 244
## 1882 2021-06-01          32.2          16.3     7.177782  6 2021 152
## 1883 2021-06-02          35.6          17.1     7.090077  6 2021 153
## 1884 2021-06-03          39.4          17.5     7.021084  6 2021 154
## 1885 2021-06-04          34.4          18.6     6.701960  6 2021 155
## 1886 2021-06-05          30.0          18.6     6.381816  6 2021 156
## 1887 2021-06-06          25.0          17.1     6.390241  6 2021 157
## 1888 2021-06-07          26.7          16.7     6.442540  6 2021 158
## 1889 2021-06-08          27.2          17.0     6.079933  6 2021 159
## 1890 2021-06-09          26.1          17.8     5.996452  6 2021 160
## 1891 2021-06-10          17.2          16.4     6.573680  6 2021 161
## 1892 2021-06-11          25.6          16.0     6.632002  6 2021 162
## 1893 2021-06-12          28.3          18.3     6.428105  6 2021 163
## 1894 2021-06-13          36.1          19.9     6.340359  6 2021 164
```

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## 1895 2021-06-14          34.4          20.9     6.111467  6 2021 165
## 1896 2021-06-15          31.7          20.7     5.843544  6 2021 166
## 1897 2021-06-16          27.8          19.1     5.955837  6 2021 167
## 1898 2021-06-17          32.8          19.2     5.796058  6 2021 168
## 1899 2021-06-18          36.1          19.9     5.686975  6 2021 169
## 1900 2021-06-19          35.0          20.5     5.605802  6 2021 170
## 1901 2021-06-20          32.8          20.7     5.537334  6 2021 171
## 1902 2021-06-21          35.6          20.8     5.605802  6 2021 172
## 1903 2021-06-22          36.7          21.5     5.480639  6 2021 173
## 1904 2021-06-23          33.3          21.0     5.533389  6 2021 174
## 1905 2021-06-24          35.0          21.3     5.472271  6 2021 175
## 1906 2021-06-25          34.4          21.3     5.442418  6 2021 176
## 1907 2021-06-26          35.0          21.5     5.488938  6 2021 177
## 1908 2021-06-27          37.2          22.2     5.459586  6 2021 178
## 1909 2021-06-28          39.4          22.7     5.451038  6 2021 179
## 1910 2021-06-29          40.6          23.2     5.141664  6 2021 180
## 1911 2021-06-30          40.0          23.3     5.111988  6 2021 181
## 1912 2021-07-01          39.4          23.2     5.204007  7 2021 182
## 1913 2021-07-02          38.9          23.1     5.159055  7 2021 183
## 1914 2021-07-03          39.4          23.1     5.231109  7 2021 184
## 1915 2021-07-04          38.3          22.7     5.293305  7 2021 185
## 1916 2021-07-05          38.3          22.6     5.451038  7 2021 186
## 1917 2021-07-06          41.7          22.7     5.293305  7 2021 187
## 1918 2021-07-07          37.2          22.9     5.247024  7 2021 188
## 1919 2021-07-08          37.2          21.9     5.141664  7 2021 189
## 1920 2021-07-09          35.0          21.7     5.068904  7 2021 190
## 1921 2021-07-10          40.0          21.6     5.075174  7 2021 191
## 1922 2021-07-11          36.7          21.9     5.192957  7 2021 192
## 1923 2021-07-12          38.9          21.6     5.337538  7 2021 193
## 1924 2021-07-13          36.1          21.5     5.318120  7 2021 194
## 1925 2021-07-14          37.2          21.3     5.398163  7 2021 195
## 1926 2021-07-15          36.7          21.6     5.463832  7 2021 196
## 1927 2021-07-16          35.6          21.5     5.365976  7 2021 197
## 1928 2021-07-17          36.7          21.4     5.393628  7 2021 198
## 1929 2021-07-18          38.3          21.4     5.497168  7 2021 199
## 1930 2021-07-19          36.1          21.5     5.598422  7 2021 200
## 1931 2021-07-20          33.3          20.8     5.579730  7 2021 201
## 1932 2021-07-21          35.0          21.2     5.723585  7 2021 202
## 1933 2021-07-22          32.8          20.8     5.707110  7 2021 203
## 1934 2021-07-23          33.9          20.3     5.680173  7 2021 204
## 1935 2021-07-24          35.0          20.5     5.598422  7 2021 205
## 1936 2021-07-25          36.7          20.7     5.564520  7 2021 206
## 1937 2021-07-26          38.9          21.0     5.620401  7 2021 207
## 1938 2021-07-27          37.8          21.5     5.568345  7 2021 208
## 1939 2021-07-28          36.1          21.9     5.624018  7 2021 209
## 1940 2021-07-29          37.2          22.4     5.587249  7 2021 210
## 1941 2021-07-30          37.8          22.8     5.533389  7 2021 211
## 1942 2021-07-31          35.6          22.9     5.505332  7 2021 212
## 1943 2021-08-01          27.8          22.2     6.333280  8 2021 213
## 1944 2021-08-02          33.9          22.4     6.342121  8 2021 214
## 1945 2021-08-03          35.6          22.8     6.190315  8 2021 215
## 1946 2021-08-04          40.6          22.4     6.144186  8 2021 216
## 1947 2021-08-05          36.1          22.3     6.035481  8 2021 217
## 1948 2021-08-06          27.8          21.3     6.049733  8 2021 218
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## 1949 2021-08-07          34.4          21.1     6.104793  8 2021 219
## 1950 2021-08-08          30.6          21.4     6.070738  8 2021 220
## 1951 2021-08-09          28.3          20.2     5.971262  8 2021 221
## 1952 2021-08-10          33.9          20.1     5.746203  8 2021 222
## 1953 2021-08-11          36.7          21.0     5.631212  8 2021 223
## 1954 2021-08-12          37.8          22.0     5.480639  8 2021 224
## 1955 2021-08-13          36.7          22.1     5.545177  8 2021 225
## 1956 2021-08-14          36.1          21.6     5.638355  8 2021 226
## 1957 2021-08-15          36.7          21.4     5.743003  8 2021 227
## 1958 2021-08-16          36.1          21.5     5.802118  8 2021 228
## 1959 2021-08-17          27.8          20.9     5.811141  8 2021 229
## 1960 2021-08-18          25.0          19.0     5.891644  8 2021 230
## 1961 2021-08-19          26.7          18.7     5.998937  8 2021 231
## 1962 2021-08-20          29.4          19.3     6.082219  8 2021 232
## 1963 2021-08-21          25.0          19.8     6.107023  8 2021 233
## 1964 2021-08-22          28.9          19.5     6.150603  8 2021 234
## 1965 2021-08-23          27.8          19.3     6.133398  8 2021 235
## 1966 2021-08-24          27.8          18.6     6.011267  8 2021 236
## 1967 2021-08-25          30.0          18.4     6.008813  8 2021 237
## 1968 2021-08-26          28.9          19.0     6.059123  8 2021 238
## 1969 2021-08-27          26.7          19.3     6.091310  8 2021 239
## 1970 2021-08-28          28.3          19.2     6.042633  8 2021 240
## 1971 2021-08-29          32.8          19.0     6.052089  8 2021 241
## 1972 2021-08-30          31.7          19.2     6.161207  8 2021 242
## 1973 2021-08-31          27.2          19.0     6.210600  8 2021 243
## 2232 2022-06-01          25.0          15.4     6.533789  6 2022 152
## 2233 2022-06-02          29.4          16.9     6.364751  6 2022 153
## 2234 2022-06-03          28.3          18.0     6.361302  6 2022 154
## 2235 2022-06-04          21.1          17.2     6.289716  6 2022 155
## 2236 2022-06-05          21.7          16.0     6.608001  6 2022 156
## 2237 2022-06-06          22.8          16.1     6.821107  6 2022 157
## 2238 2022-06-07          25.0          17.0     6.638568  6 2022 158
## 2239 2022-06-08          22.2          17.0     6.504288  6 2022 159
## 2240 2022-06-09          30.0          17.1     6.499787  6 2022 160
## 2241 2022-06-10          32.8          18.0     6.956545  6 2022 161
## 2242 2022-06-11          30.6          17.3     7.146772  6 2022 162
## 2243 2022-06-12          18.3          15.3     7.346010  6 2022 163
## 2244 2022-06-13          15.6          13.0     7.560080  6 2022 164
## 2245 2022-06-14          16.1          12.1     7.986165  6 2022 165
## 2246 2022-06-15          25.0          12.7     8.016318  6 2022 166
## 2247 2022-06-16          32.8          13.8     7.951559  6 2022 167
## 2248 2022-06-17          25.6          14.4     7.659171  6 2022 168
## 2249 2022-06-18          23.9          14.8     7.420579  6 2022 169
## 2250 2022-06-19          21.7          14.6     7.358831  6 2022 170
## 2251 2022-06-20          23.3          14.7     7.319865  6 2022 171
## 2252 2022-06-21          28.3          15.5     7.215240  6 2022 172
## 2253 2022-06-22          32.2          16.1     7.130899  6 2022 173
## 2254 2022-06-23          31.1          17.0     6.891626  6 2022 174
## 2255 2022-06-24          27.8          16.6     6.857514  6 2022 175
## 2256 2022-06-25          30.6          16.4     6.825460  6 2022 176
## 2257 2022-06-26          34.4          16.9     6.802395  6 2022 177
## 2258 2022-06-27          40.0          17.7     6.765039  6 2022 178
## 2259 2022-06-28          37.2          18.0     6.721426  6 2022 179
## 2260 2022-06-29          30.0          17.8     6.593045  6 2022 180
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## 2261 2022-06-30          33.9          17.6     6.580639  6 2022 181
## 2262 2022-07-01          34.4          18.1     6.614726  7 2022 182
## 2263 2022-07-02          35.0          17.6     6.563856  7 2022 183
## 2264 2022-07-03          31.1          18.0     6.580639  7 2022 184
## 2265 2022-07-04          27.8          17.9     6.628041  7 2022 185
## 2266 2022-07-05          32.8          17.6     6.683361  7 2022 186
## 2267 2022-07-06          33.3          18.3     6.664409  7 2022 187
## 2268 2022-07-07          35.0          18.9     6.628041  7 2022 188
## 2269 2022-07-08          35.6          19.1     6.583409  7 2022 189
## 2270 2022-07-09          34.4          19.2     6.577861  7 2022 190
## 2271 2022-07-10          31.7          18.9     6.603944  7 2022 191
## 2272 2022-07-11          33.9          18.6     6.638568  7 2022 192
## 2273 2022-07-12          38.3          18.9     6.593045  7 2022 193
## 2274 2022-07-13          37.8          19.1     6.634633  7 2022 194
## 2275 2022-07-14          39.4          18.9     6.670766  7 2022 195
## 2276 2022-07-15          37.8          19.6     6.666957  7 2022 196
## 2277 2022-07-16          40.0          19.5     6.650279  7 2022 197
## 2278 2022-07-17          38.9          19.0     6.688355  7 2022 198
## 2279 2022-07-18          32.2          18.8     6.709304  7 2022 199
## 2280 2022-07-19          36.7          18.5     6.712956  7 2022 200
## 2281 2022-07-20          38.3          19.1     6.725034  7 2022 201
## 2282 2022-07-21          37.8          19.4     6.678342  7 2022 202
## 2283 2022-07-22          36.1          19.3     6.668228  7 2022 203
## 2284 2022-07-23          35.6          19.1     6.663133  7 2022 204
## 2285 2022-07-24          34.4          19.1     6.695799  7 2022 205
## 2286 2022-07-25          35.6          19.3     6.705639  7 2022 206
## 2287 2022-07-26          37.8          19.6     6.678342  7 2022 207
## 2288 2022-07-27          38.9          20.1     6.638568  7 2022 208
## 2289 2022-07-28          39.4          20.4     6.659294  7 2022 209
## 2290 2022-07-29          40.0          20.6     6.665684  7 2022 210
## 2291 2022-07-30          39.4          20.4     6.645091  7 2022 211
## 2292 2022-07-31          41.1          20.5     6.692084  7 2022 212
## 2293 2022-08-01          38.9          20.4     6.705639  8 2022 213
## 2294 2022-08-02          31.1          19.6     6.670766  8 2022 214
## 2295 2022-08-03          36.7          19.6     6.629363  8 2022 215
## 2296 2022-08-04          37.2          21.1     5.913503  8 2022 216
## 2297 2022-08-05          33.9          20.8     5.673323  8 2022 217
## 2298 2022-08-06          31.7          20.8     5.739793  8 2022 218
## 2299 2022-08-07          35.6          20.2     5.690359  8 2022 219
## 2300 2022-08-08          40.0          20.7     5.789960  8 2022 220
## 2301 2022-08-09          37.2          21.2     5.758902  8 2022 221
## 2302 2022-08-10          33.9          21.0     5.802118  8 2022 222
## 2303 2022-08-11          37.8          21.2     5.726848  8 2022 223
## 2304 2022-08-12          36.7          21.5     5.749393  8 2022 224
## 2305 2022-08-13          35.0          21.8     5.720312  8 2022 225
## 2306 2022-08-14          35.6          21.2     5.783825  8 2022 226
## 2307 2022-08-15          37.2          20.9     5.793014  8 2022 227
## 2308 2022-08-16          38.9          21.0     5.655992  8 2022 228
## 2309 2022-08-17          39.4          21.1     5.669881  8 2022 229
## 2310 2022-08-18          37.2          21.1     5.686975  8 2022 230
## 2311 2022-08-19          35.6          21.6     5.765191  8 2022 231
## 2312 2022-08-20          35.6          21.9     5.805135  8 2022 232
## 2313 2022-08-21          37.8          22.1     5.843544  8 2022 233
## 2314 2022-08-22          36.7          22.0     5.820083  8 2022 234
```

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## 2315 2022-08-23                36.1            21.7     5.826000  8 2022 235
## 2316 2022-08-24                38.3            21.5     5.814131  8 2022 236
## 2317 2022-08-25                35.0            21.5     5.768321  8 2022 237
## 2318 2022-08-26                35.6            21.6     5.739793  8 2022 238
## 2319 2022-08-27                30.0            21.1     5.831882  8 2022 239
## 2320 2022-08-28                28.9            19.8     5.968708  8 2022 240
## 2321 2022-08-29                34.4            19.6     6.025866  8 2022 241
## 2322 2022-08-30                36.7            20.1     5.983936  8 2022 242
## 2323 2022-08-31                41.1            20.8     6.001415  8 2022 243
```

```
daily_df_summer<-merge(daily_df_summer,lucky,by.x="date", by.y="DateTime")
daily_df_summer
```

```
##          date max_AirTemperature_C mean_StreamTemp log_median_Q mo   yr doy
## 1  2022-06-01                25.0            15.4     6.533789  6 2022 152
## 2  2022-06-02                29.4            16.9     6.364751  6 2022 153
## 3  2022-06-03                28.3            18.0     6.361302  6 2022 154
## 4  2022-06-04                21.1            17.2     6.289716  6 2022 155
## 5  2022-06-05                21.7            16.0     6.608001  6 2022 156
## 6  2022-06-06                22.8            16.1     6.821107  6 2022 157
## 7  2022-06-07                25.0            17.0     6.638568  6 2022 158
## 8  2022-06-08                22.2            17.0     6.504288  6 2022 159
## 9  2022-06-09                30.0            17.1     6.499787  6 2022 160
## 10 2022-06-10                32.8            18.0     6.956545  6 2022 161
## 11 2022-06-11                30.6            17.3     7.146772  6 2022 162
## 12 2022-06-12                18.3            15.3     7.346010  6 2022 163
## 13 2022-06-13                15.6            13.0     7.560080  6 2022 164
## 14 2022-06-14                16.1            12.1     7.986165  6 2022 165
## 15 2022-06-15                25.0            12.7     8.016318  6 2022 166
## 16 2022-06-16                32.8            13.8     7.951559  6 2022 167
## 17 2022-06-17                25.6            14.4     7.659171  6 2022 168
## 18 2022-06-18                23.9            14.8     7.420579  6 2022 169
## 19 2022-06-19                21.7            14.6     7.358831  6 2022 170
## 20 2022-06-20                23.3            14.7     7.319865  6 2022 171
## 21 2022-06-21                28.3            15.5     7.215240  6 2022 172
## 22 2022-06-22                32.2            16.1     7.130899  6 2022 173
## 23 2022-06-23                31.1            17.0     6.891626  6 2022 174
## 24 2022-06-24                27.8            16.6     6.857514  6 2022 175
## 25 2022-06-25                30.6            16.4     6.825460  6 2022 176
## 26 2022-06-26                34.4            16.9     6.802395  6 2022 177
## 27 2022-06-27                40.0            17.7     6.765039  6 2022 178
## 28 2022-06-28                37.2            18.0     6.721426  6 2022 179
## 29 2022-06-29                30.0            17.8     6.593045  6 2022 180
## 30 2022-06-30                33.9            17.6     6.580639  6 2022 181
## 31 2022-07-01                34.4            18.1     6.614726  7 2022 182
## 32 2022-07-02                35.0            17.6     6.563856  7 2022 183
## 33 2022-07-03                31.1            18.0     6.580639  7 2022 184
## 34 2022-07-04                27.8            17.9     6.628041  7 2022 185
## 35 2022-07-05                32.8            17.6     6.683361  7 2022 186
## 36 2022-07-06                33.3            18.3     6.664409  7 2022 187
## 37 2022-07-07                35.0            18.9     6.628041  7 2022 188
## 38 2022-07-08                35.6            19.1     6.583409  7 2022 189
## 39 2022-07-09                34.4            19.2     6.577861  7 2022 190
## 40 2022-07-10                31.7            18.9     6.603944  7 2022 191
## 41 2022-07-11                33.9            18.6     6.638568  7 2022 192
```

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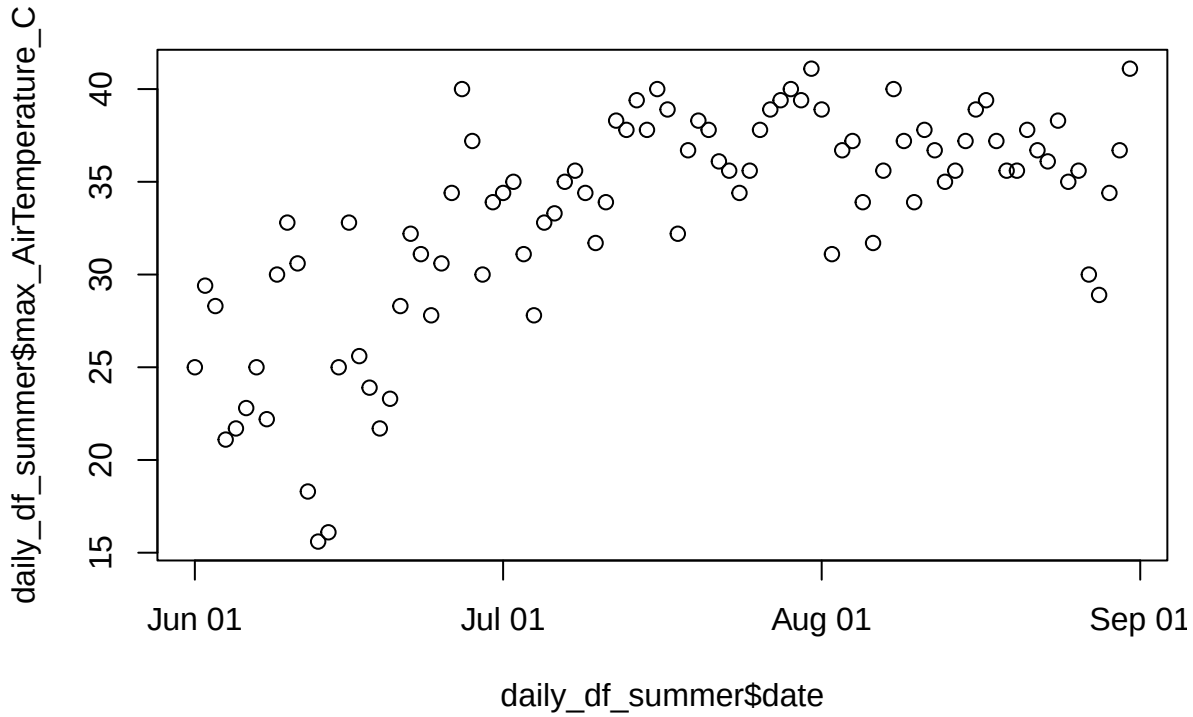
## 42 2022-07-12                38.3           18.9     6.593045  7 2022 193
## 43 2022-07-13                37.8           19.1     6.634633  7 2022 194
## 44 2022-07-14                39.4           18.9     6.670766  7 2022 195
## 45 2022-07-15                37.8           19.6     6.666957  7 2022 196
## 46 2022-07-16                40.0           19.5     6.650279  7 2022 197
## 47 2022-07-17                38.9           19.0     6.688355  7 2022 198
## 48 2022-07-18                32.2           18.8     6.709304  7 2022 199
## 49 2022-07-19                36.7           18.5     6.712956  7 2022 200
## 50 2022-07-20                38.3           19.1     6.725034  7 2022 201
## 51 2022-07-21                37.8           19.4     6.678342  7 2022 202
## 52 2022-07-22                36.1           19.3     6.668228  7 2022 203
## 53 2022-07-23                35.6           19.1     6.663133  7 2022 204
## 54 2022-07-24                34.4           19.1     6.695799  7 2022 205
## 55 2022-07-25                35.6           19.3     6.705639  7 2022 206
## 56 2022-07-26                37.8           19.6     6.678342  7 2022 207
## 57 2022-07-27                38.9           20.1     6.638568  7 2022 208
## 58 2022-07-28                39.4           20.4     6.659294  7 2022 209
## 59 2022-07-29                40.0           20.6     6.665684  7 2022 210
## 60 2022-07-30                39.4           20.4     6.645091  7 2022 211
## 61 2022-07-31                41.1           20.5     6.692084  7 2022 212
## 62 2022-08-01                38.9           20.4     6.705639  8 2022 213
## 63 2022-08-02                31.1           19.6     6.670766  8 2022 214
## 64 2022-08-03                36.7           19.6     6.629363  8 2022 215
## 65 2022-08-04                37.2           21.1     5.913503  8 2022 216
## 66 2022-08-05                33.9           20.8     5.673323  8 2022 217
## 67 2022-08-06                31.7           20.8     5.739793  8 2022 218
## 68 2022-08-07                35.6           20.2     5.690359  8 2022 219
## 69 2022-08-08                40.0           20.7     5.789960  8 2022 220
## 70 2022-08-09                37.2           21.2     5.758902  8 2022 221
## 71 2022-08-10                33.9           21.0     5.802118  8 2022 222
## 72 2022-08-11                37.8           21.2     5.726848  8 2022 223
## 73 2022-08-12                36.7           21.5     5.749393  8 2022 224
## 74 2022-08-13                35.0           21.8     5.720312  8 2022 225
## 75 2022-08-14                35.6           21.2     5.783825  8 2022 226
## 76 2022-08-15                37.2           20.9     5.793014  8 2022 227
## 77 2022-08-16                38.9           21.0     5.655992  8 2022 228
## 78 2022-08-17                39.4           21.1     5.669881  8 2022 229
## 79 2022-08-18                37.2           21.1     5.686975  8 2022 230
## 80 2022-08-19                35.6           21.6     5.765191  8 2022 231
## 81 2022-08-20                35.6           21.9     5.805135  8 2022 232
## 82 2022-08-21                37.8           22.1     5.843544  8 2022 233
## 83 2022-08-22                36.7           22.0     5.820083  8 2022 234
## 84 2022-08-23                36.1           21.7     5.826000  8 2022 235
## 85 2022-08-24                38.3           21.5     5.814131  8 2022 236
## 86 2022-08-25                35.0           21.5     5.768321  8 2022 237
## 87 2022-08-26                35.6           21.6     5.739793  8 2022 238
## 88 2022-08-27                30.0           21.1     5.831882  8 2022 239
## 89 2022-08-28                28.9           19.8     5.968708  8 2022 240
## 90 2022-08-29                34.4           19.6     6.025866  8 2022 241
## 91 2022-08-30                36.7           20.1     5.983936  8 2022 242
## 92 2022-08-31                41.1           20.8     6.001415  8 2022 243
##     luc_id   luc_qu  luc_fb luc_qrd  luc_qt luc_xqd luc_qsd   luc_af  luc_qd
## 1  3082.51  6204.82 3035.45    0.25 3044.92 3044.12   25.31 213413.9 3045.17
## 2  3484.95  6373.82 3035.79    0.25 3060.07 3060.45   23.05 214256.1 3060.33
```

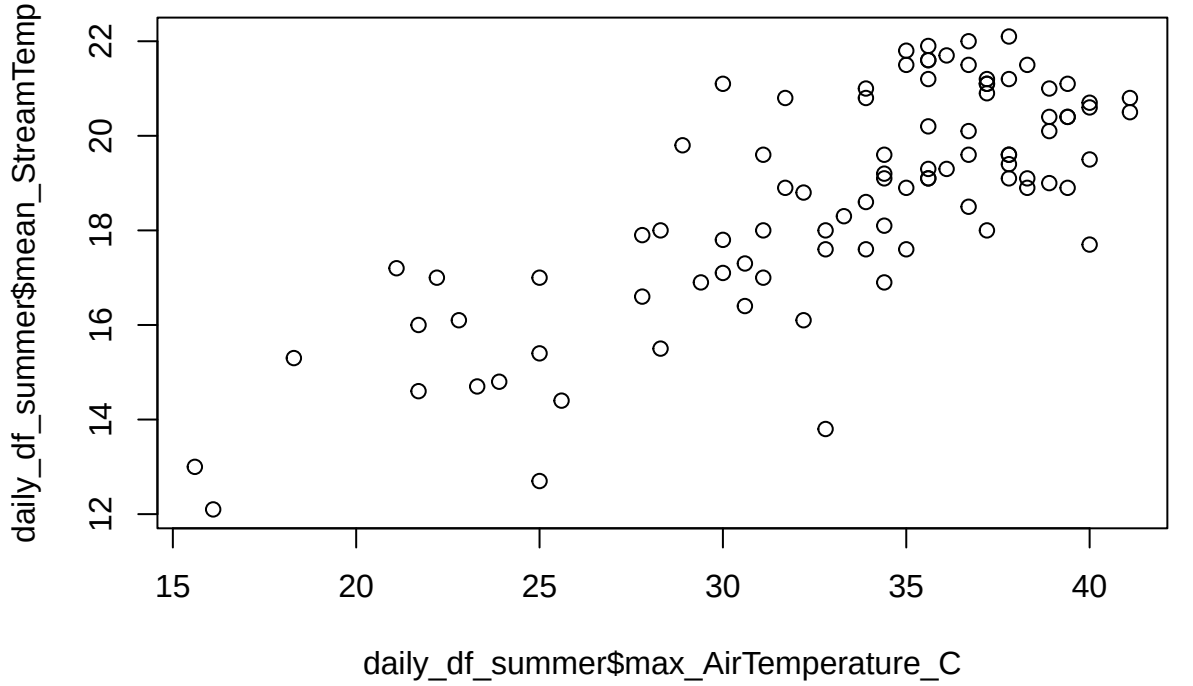
```
## 3  4044.52  6152.45 3036.58    0.23 3055.06 3054.30   26.30 216218.2 3055.30
## 4  4069.23  7442.10 3037.39    0.24 3050.80 3049.47   24.76 218237.7 3051.04
## 5  4104.38  8088.31 3038.23    0.25 3043.25 3040.92   24.24 220342.0 3043.50
## 6  5538.42  8661.23 3040.19    0.25 3044.11 3044.35   22.85 225288.9 3044.36
## 7  7033.54  8072.12 3043.31    0.25 3008.88 3010.32   22.15 233271.1 3009.13
## 8  6924.95  7727.58 3046.26    0.25 3058.31 3060.04   23.13 240940.0 3058.56
## 9  6898.45  7155.07 3048.88    0.25 3415.08 3413.48   27.22 247848.7 3415.34
## 10 5266.44  7592.16 3049.99    0.25 3776.22 3773.66   26.66 250804.0 3776.48
## 11 3791.06  8718.79 3049.93    0.25 3871.55 3871.08   24.49 250643.8 3871.80
## 12 4724.57  9694.65 3050.56    0.25 3873.62 3870.93   29.53 252331.2 3873.87
## 13 5978.41 10468.02 3051.44    0.25 4786.47 4778.07   34.70 254694.8 4786.72
## 14 6247.38  7944.91 3052.08    0.25 5377.76 5376.74   35.53 256419.2 5378.01
## 15 6088.89  6448.86 3052.60    0.25 5378.73 5379.58   33.80 257827.3 5378.99
## 16 5338.11  5765.65 3052.92    0.25 4900.99 4907.97   33.71 258693.8 4901.24
## 17 4870.96  6036.59 3053.34    0.25 4294.72 4292.39   32.29 259836.2 4294.97
## 18 3732.77  6570.22 3053.05    0.25 4130.36 4128.80   30.05 259047.1 4130.62
## 19 4286.62  6290.68 3053.17    0.25 4121.67 4120.79   28.85 259373.8 4121.93
## 20 4095.71  5496.28 3053.08    0.25 4219.26 4218.35   30.46 259128.2 4219.51
## 21 4214.03  4898.69 3052.99    0.25 4336.92 4331.10   36.58 258884.0 4337.17
## 22 4494.36  4723.25 3053.21    0.25 4192.14 4190.11   33.51 259482.9 4192.41
## 23 4969.99  4719.92 3053.82    0.25 4132.66 4134.54   32.22 261143.2 4132.92
## 24 4540.06  4886.42 3054.05    0.25 4223.21 4220.03   28.24 261771.1 4223.47
## 25 4318.47  4574.08 3054.10    0.25 4249.58 4250.44   25.23 261907.3 4249.83
## 26 4312.25  4223.01 3054.14    0.25 4256.83 4257.57   24.90 262016.7 4257.08
## 27 4149.43  4015.33 3054.06    0.25 4259.36 4255.04   26.99 261798.2 4259.61
## 28 4102.15  3894.43 3053.93    0.25 4281.04 4279.93   29.19 261442.8 4281.30
## 29 4240.69  3772.83 3053.89    0.25 4295.45 4295.59   29.11 261333.7 4295.70
## 30 4224.42  3491.36 3053.84    0.25 4292.46 4292.07   28.90 261198.2 4292.72
## 31 4204.96  3214.78 3053.78    0.25 4286.97 4283.53   31.63 261035.1 4287.22
## 32 4279.50  3039.25 3053.79    0.25 4265.62 4263.72   28.04 261062.1 4265.87
## 33 4365.75  2870.39 3053.86    0.25 4269.61 4270.69   26.61 261252.3 4269.86
## 34 4393.88  2710.97 3053.95    0.25 4269.82 4268.01   28.42 261497.9 4270.07
## 35 4349.14  2590.61 3054.01    0.25 4266.63 4263.98   27.57 261661.0 4266.88
## 36 4285.60  2372.79 3054.02    0.25 4271.21 4270.93   26.86 261689.0 4271.47
## 37 4295.73  2283.60 3054.04    0.25 4267.73 4267.04   28.27 261744.1 4267.98
## 38 4512.44  2182.18 3054.22    0.25 4264.22 4263.86   25.80 262235.9 4264.48
## 39 4503.45  2012.36 3054.39    0.25 4268.86 4266.23   30.69 262700.7 4269.12
## 40 4293.61  1943.69 3054.41    0.25 4265.60 4265.76   28.30 262755.8 4265.85
## 41 4247.83  1861.10 3054.37    0.25 4302.75 4301.97   27.14 262646.3 4303.00
## 42 4332.39  1669.38 3054.38    0.25 4318.35 4316.22   28.43 262673.7 4318.60
## 43 4432.54  1573.41 3054.46    0.25 4321.77 4322.90   26.57 262892.9 4322.02
## 44 4429.24  1641.20 3054.53    0.25 4332.09 4330.61   31.95 263085.1 4332.34
## 45 4371.50  1494.73 3054.56    0.25 4330.36 4331.91   26.22 263166.2 4330.62
## 46 4325.11  1492.70 3054.56    0.25 4324.85 4324.32   29.29 263166.2 4325.11
## 47 4242.23  1406.29 3054.49    0.25 4338.37 4337.92   29.49 262975.0 4338.62
## 48 4291.57  1396.64 3054.46    0.25 4332.69 4331.68   28.93 262892.9 4332.95
## 49 4614.20  1571.05 3054.67    0.25 4324.11 4325.44   28.88 263467.8 4324.36
## 50 4292.15  1210.18 3054.64    0.25 4333.77 4332.95   29.54 263384.7 4334.03
## 51 4263.50  1224.38 3054.59    0.25 4332.04 4332.86   29.76 263248.2 4332.30
## 52 4216.39  1164.66 3054.50    0.25 4339.78 4338.34   32.05 263003.0 4340.03
## 53 4186.72  1110.29 3054.40    0.25 4324.75 4327.22   28.26 262728.7 4325.00
## 54 4339.34  1085.45 3054.40    0.25 4339.08 4334.39   31.52 262728.7 4339.34
## 55 4377.08  1102.01 3054.43    0.25 4335.44 4333.62   30.91 262810.8 4335.69
## 56 4352.65   994.40 3054.45    0.25 4324.57 4324.09   26.44 262866.0 4324.83
```

```
## 57 4351.61  1049.32 3054.46    0.25 4337.80 4335.18   32.95 262892.9 4338.05
## 58 4278.75  1105.02 3054.42    0.25 4334.00 4331.57   30.83 262782.8 4334.26
## 59 4289.83  1007.20 3054.39    0.25 4330.94 4333.81   25.51 262700.7 4331.21
## 60 4289.19   929.42 3054.36    0.24 4330.00 4331.65   30.31 262619.3 4330.24
## 61 4378.44   975.32 3054.39    0.11 4337.28 4334.23   27.90 262700.7 4337.39
## 62 4320.52   886.13 3054.38    0.20 4333.95 4333.59   31.09 262673.7 4334.15
## 63 4310.16   977.62 3054.36    0.25 4337.32 4332.42   29.71 262619.3 4337.58
## 64 3932.50   947.83 3054.32    0.25 3987.75 3994.66   24.91 262509.2 3988.01
## 65 3636.02   981.07 3054.22    0.25 3773.54 3774.93   25.08 262235.9 3773.79
## 66 3397.73   824.46 3053.95    0.25 3769.58 3768.45   27.66 261497.9 3769.83
## 67 3111.35   828.99 3053.47    0.25 3770.02 3769.30   26.05 260190.9 3770.27
## 68 3094.61   824.34 3052.98    0.25 3766.90 3768.69   26.30 258857.0 3767.15
## 69 3001.91   815.34 3052.42    0.25 3766.56 3765.94   22.81 257339.8 3766.81
## 70 3367.44   702.41 3052.15    0.25 3735.76 3734.94   23.15 256608.7 3736.01
## 71 3748.48   930.19 3052.18    0.25 3707.35 3707.32   23.69 256689.8 3707.60
## 72 3686.74   917.86 3052.18    0.25 3686.48 3686.31   23.75 256689.8 3686.74
## 73 3541.85   785.07 3052.08    0.25 3678.03 3678.92   25.92 256419.2 3678.28
## 74 3489.21   890.23 3051.94    0.25 3679.72 3680.91   25.91 256040.8 3679.97
## 75 3404.37   733.80 3051.74    0.25 3675.29 3675.61   23.36 255503.0 3675.55
## 76 1998.44   749.12 3050.50    0.25 3678.06 3679.07   23.75 252171.0 3678.31
## 77 1248.53   796.80 3048.68    0.25 3694.59 3697.14   26.47 247318.8 3694.84
## 78 1089.64   749.83 3046.72    0.25 3697.39 3697.04   24.57 242145.9 3697.64
## 79 1018.39   784.46 3044.69    0.25 3691.27 3690.79   26.06 236843.9 3691.52
## 80 1069.23   755.64 3042.69    0.25 3675.02 3674.06   23.74 231674.9 3675.27
## 81 1103.93   934.53 3040.70    0.25 3669.87 3668.12   28.19 226584.9 3670.13
## 82 1116.43   825.02 3038.70    0.25 3667.77 3669.46   23.73 221523.9 3668.02
## 83  770.14   891.14 3036.41    0.25 3658.31 3661.00   23.32 215794.8 3658.56
## 84  587.97   889.46 3033.95    0.25 3650.99 3651.79   24.19 209718.9 3651.24
## 85  298.37   720.86 3031.22    0.25 3649.28 3648.48   26.81 203071.9 3649.54
## 86  154.45   751.38 3028.33    0.25 3645.43 3640.54   26.67 196147.2 3645.68
## 87  169.57   727.68 3025.41    0.25 3639.19 3641.22   25.18 189264.8 3639.44
## 88  147.34   670.67 3022.42    0.25 3639.95 3640.23   25.05 182336.8 3640.20
## 89  164.83   691.18 3019.39    0.25 3645.39 3643.76   26.14 175432.8 3645.64
## 90  181.19   542.18 3016.34    0.25 3626.19 3627.55   23.49 168599.2 3626.44
## 91  378.02   676.48 3013.43    0.25 3609.15 3609.54   23.54 162189.9 3609.40
## 92  499.99   705.69 3010.61    0.25 3579.00 3580.16   23.49 156082.2 3579.25
```

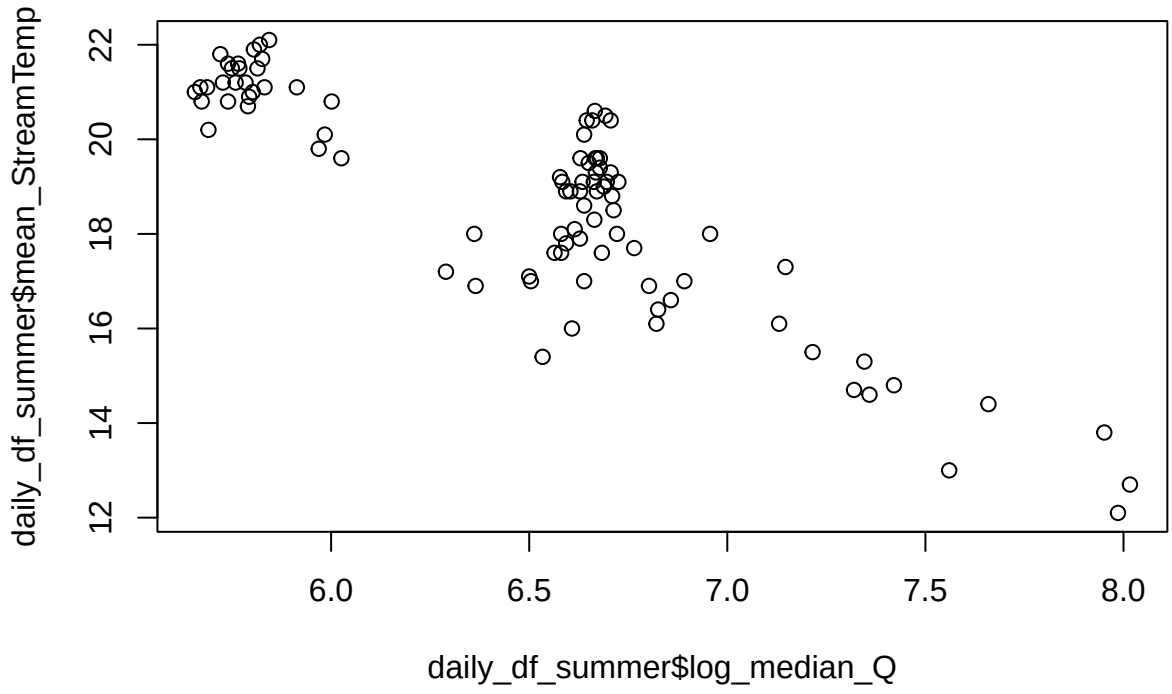
```
plot(daily_df_summer$date,daily_df_summer$max_AirTemperature_C)
```



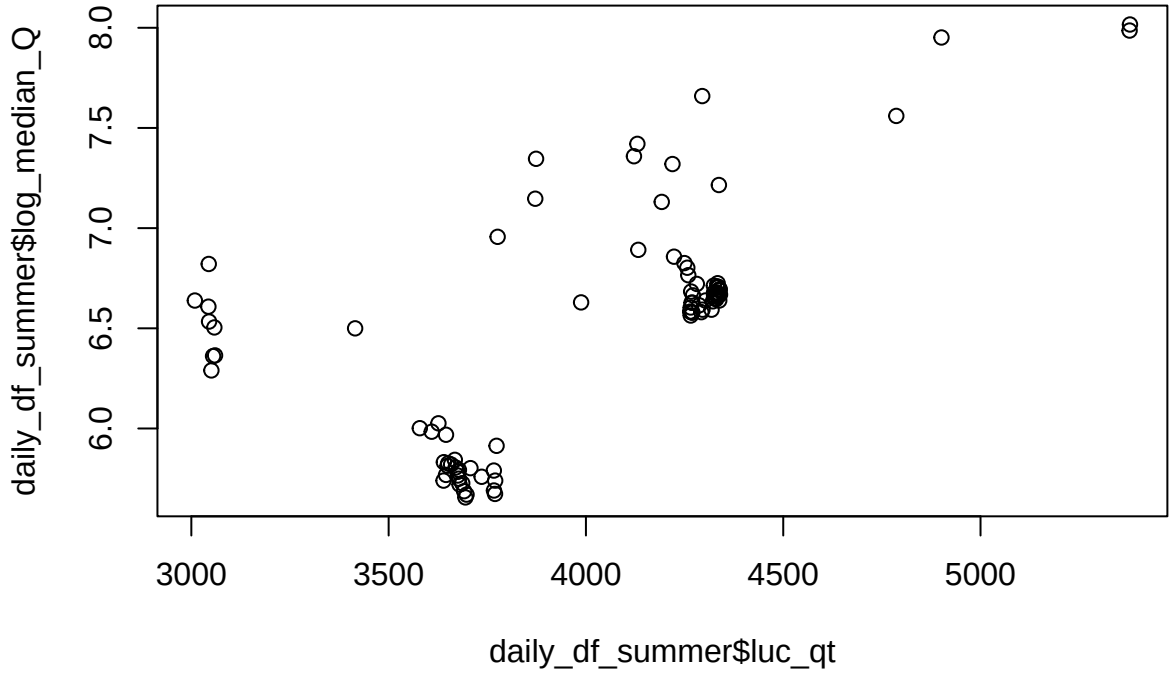

```
plot( daily_df_summer$max_AirTemperature_C, daily_df_summer$mean_StreamTemp)
```




```
plot( daily_df_summer$log_median_Q , daily_df_summer$mean_StreamTemp)
```

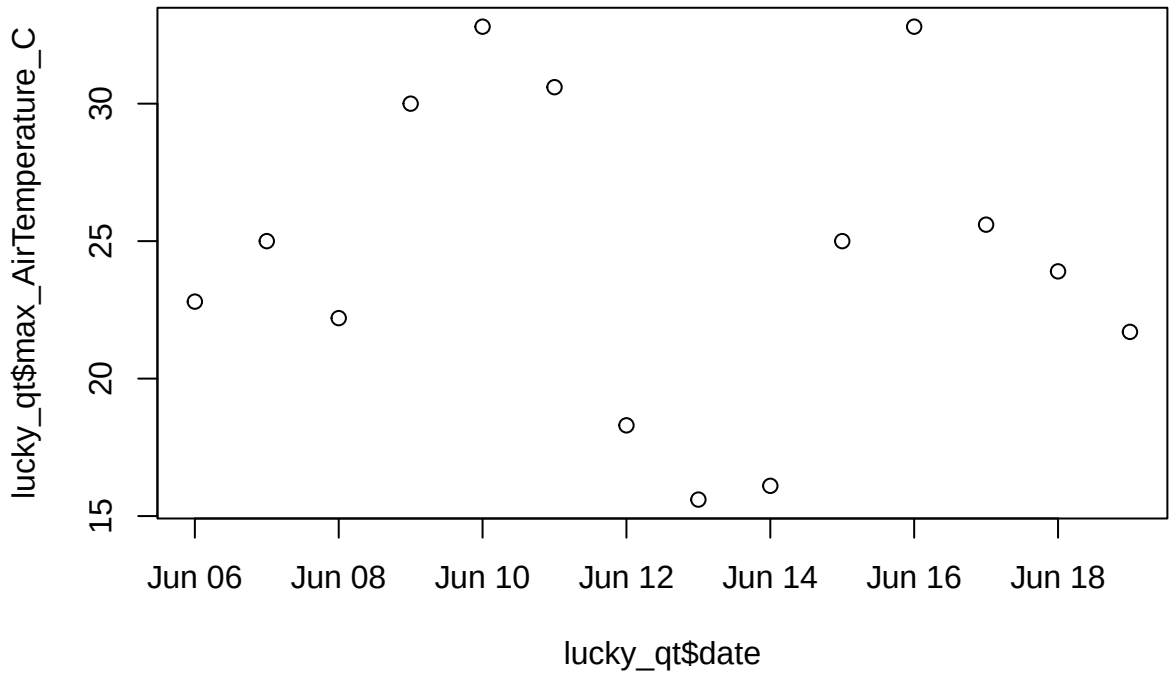



```
plot( daily_df_summer$luc_qt , daily_df_summer$log_median_Q  )
```

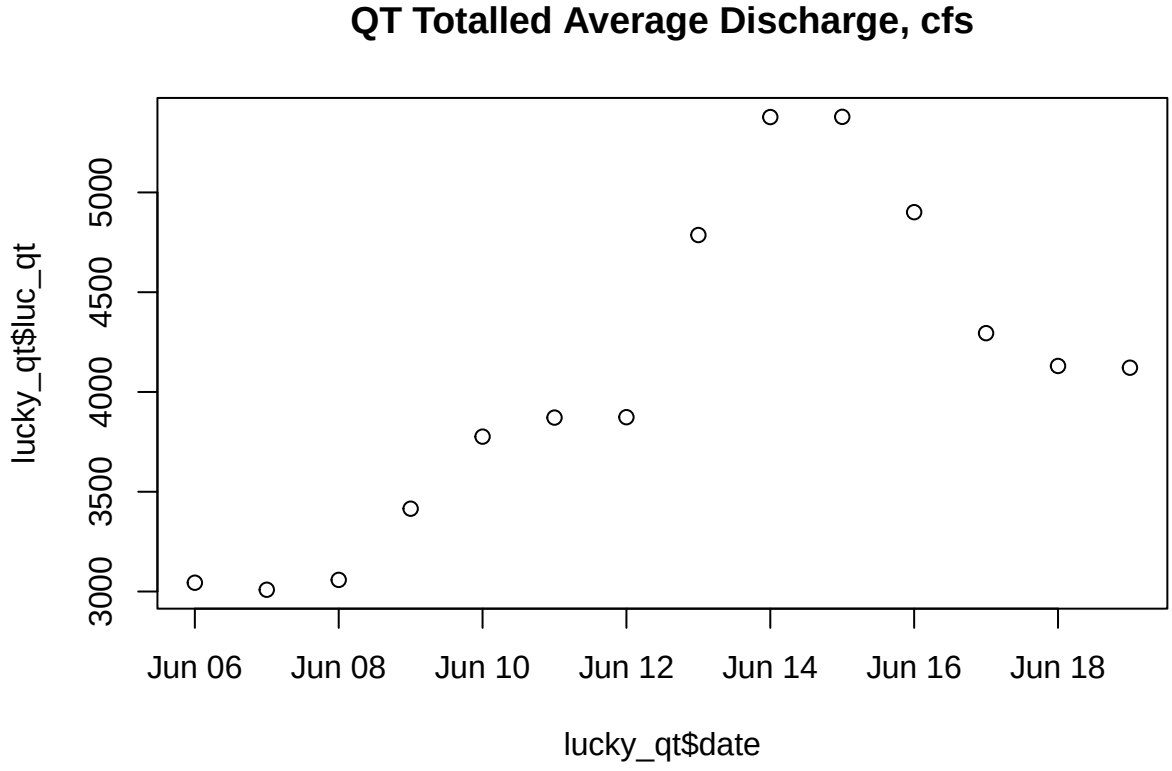


Starting on June 9, 2022, the Bureau of Reclamation and the U.S. Army Corps of Engineers began increasing flows downstream of Lucky Peak Dam to provide additional water for salmon migration in the lower Snake and Columbia rivers.

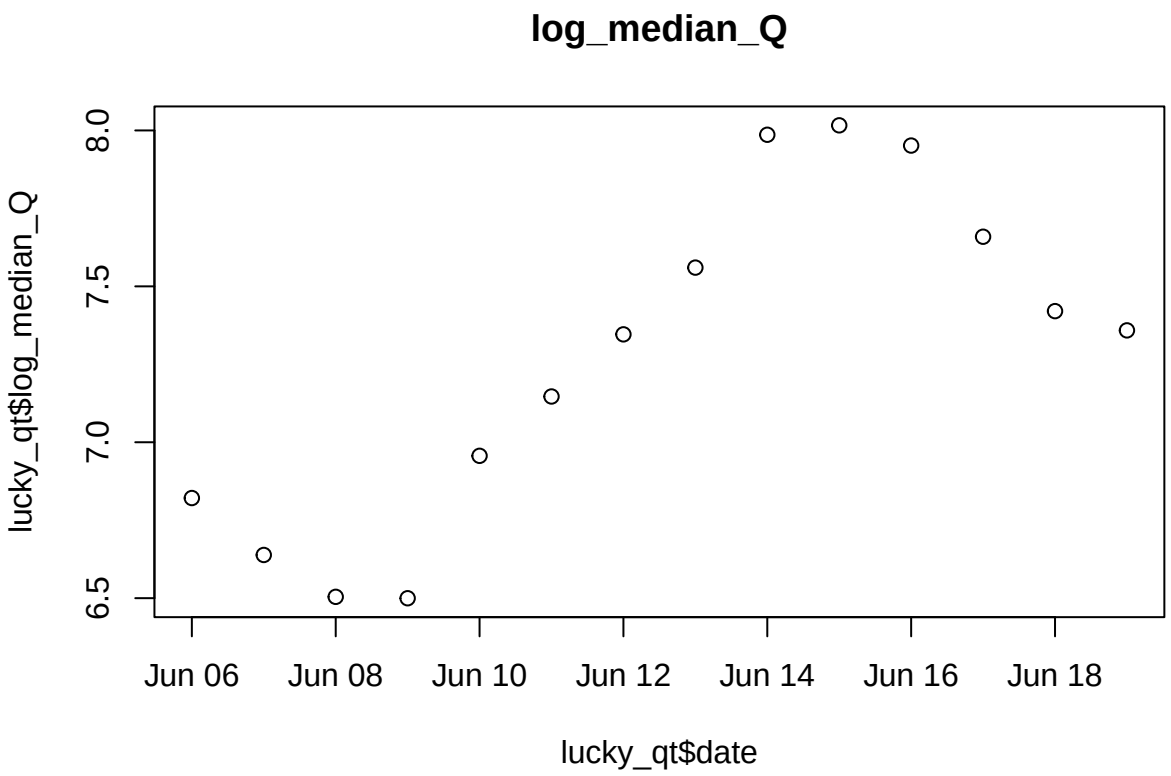
```
lucky_qt<-daily_df_summer[ daily_df_summer$date>=as.Date(  "2022-06-06",format="%Y-%m-%d" ) & daily_df_s
plot(lucky_qt$date, lucky_qt$max_AirTemperature_C)
```




```
plot(lucky_qt$date, lucky_qt$luc_qt,main="QT Totalled Average Discharge, cfs" )
```




```
plot(lucky_qt$date, lucky_qt$log_median_Q ,main="log_median_Q" )
```




```
plot(lucky_qt$date, lucky_qt$mean_StreamTemp ,main="mean_StreamTemp" )
```