# Tarea_diplomado_Paula

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### Habilita Librerias

### Summary

```
summary(cars)
```

```
##      speed           dist
##  Min.   : 4.0   Min.   :  2.00
##  1st Qu.:12.0   1st Qu.: 26.00
##  Median :15.0   Median : 36.00
##  Mean   :15.4   Mean   : 42.98
##  3rd Qu.:19.0   3rd Qu.: 56.00
##  Max.   :25.0   Max.   :120.00
```

### Variables categoricas Seasons, time, hours y replicate asigna factor

```
Datos_Proyecto <- read_excel("Datos_Proyecto.xlsx")
summary(Datos_Proyecto)
```

```
##    Seasons              time            Replicate             Chla
##  Length:108         Length:108         Length:108         Min.   :0.6730
##  Class :character   Class :character   Class :character   1st Qu.:0.9888
##  Mode  :character   Mode  :character   Mode  :character   Median :1.1660
##                                                           Mean   :1.1856
##                                                           3rd Qu.:1.3813
##                                                           Max.   :1.9690
##       Chlc               Car                PC              DPPH
##  Min.   :0.01000   Min.   :0.4190   Min.   : 4.600   Min.   : 3.792
##  1st Qu.:0.06775   1st Qu.:0.6240   1st Qu.: 9.953   1st Qu.: 6.539
##  Median :0.09500   Median :0.7520   Median :13.815   Median : 7.769
##  Mean   :0.09365   Mean   :0.7557   Mean   :15.153   Mean   : 7.444
##  3rd Qu.:0.10975   3rd Qu.:0.8780   3rd Qu.:18.990   3rd Qu.: 8.433
##  Max.   :0.22100   Max.   :1.2080   Max.   :37.340   Max.   :10.097
##   Temperature          pH           Salinity          PAR
##  Min.   :11.54   Min.   :7.620   Min.   :16.44   Min.   :   9.768
##  1st Qu.:12.29   1st Qu.:7.850   1st Qu.:29.62   1st Qu.: 196.000
##  Median :12.88   Median :7.960   Median :34.10   Median : 525.793
##  Mean   :13.98   Mean   :7.982   Mean   :30.49   Mean   : 569.983
##  3rd Qu.:15.35   3rd Qu.:8.150   3rd Qu.:34.63   3rd Qu.: 764.500
##  Max.   :18.02   Max.   :8.500   Max.   :34.90   Max.   :1921.000
```

### Transforma variables a factores

```
Datos_Proyecto$Seasons <- as.factor(Datos_Proyecto$Seasons)
Datos_Proyecto$time <- as.factor(Datos_Proyecto$time)
Datos_Proyecto$Replicate <- as.factor(Datos_Proyecto$Replicate)

summary(Datos_Proyecto)
```

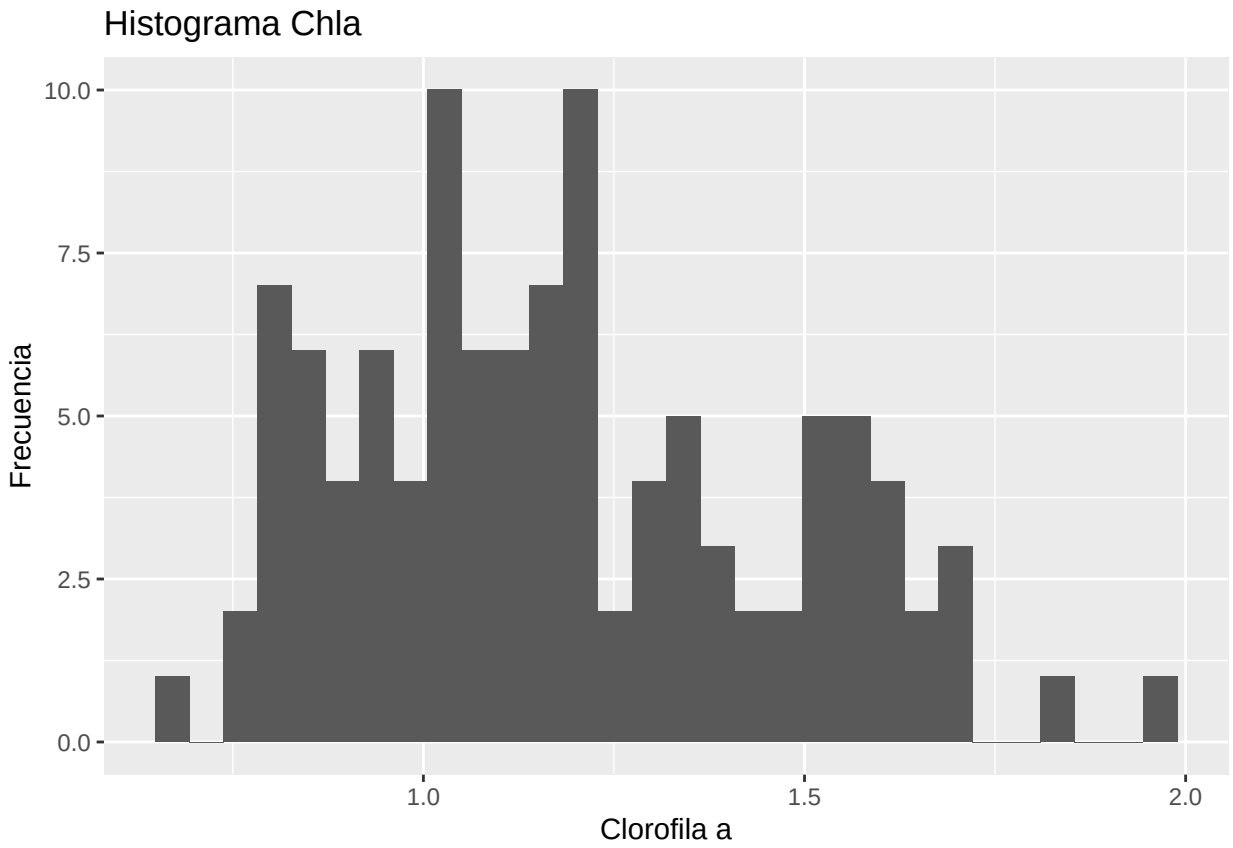
```
##    Seasons      time      Replicate       Chla            Chlc        
##  Autumn:27   day 1:36   R1     :12   Min.   :0.6730   Min.   :0.01000  
##  Spring:27   day 2:36   R2     :12   1st Qu.:0.9888   1st Qu.:0.06775  
##  Summer:27   day 3:36   R3     :12   Median :1.1660   Median :0.09500  
##  Winter:27              R4     :12   Mean   :1.1856   Mean   :0.09365  
##                         R5     :12   3rd Qu.:1.3813   3rd Qu.:0.10975  
##                         R6     :12   Max.   :1.9690   Max.   :0.22100  
##                         (Other):36                                     
##       Car                PC              DPPH          Temperature    
##  Min.   :0.4190   Min.   : 4.600   Min.   : 3.792   Min.   :11.54  
##  1st Qu.:0.6240   1st Qu.: 9.953   1st Qu.: 6.539   1st Qu.:12.29  
##  Median :0.7520   Median :13.815   Median : 7.769   Median :12.88  
##  Mean   :0.7557   Mean   :15.153   Mean   : 7.444   Mean   :13.98  
##  3rd Qu.:0.8780   3rd Qu.:18.990   3rd Qu.: 8.433   3rd Qu.:15.35  
##  Max.   :1.2080   Max.   :37.340   Max.   :10.097   Max.   :18.02  
##                                                                     
##        pH           Salinity          PAR          
##  Min.   :7.620   Min.   :16.44   Min.   :   9.768  
##  1st Qu.:7.850   1st Qu.:29.62   1st Qu.: 196.000  
##  Median :7.960   Median :34.10   Median : 525.793  
##  Mean   :7.982   Mean   :30.49   Mean   : 569.983  
##  3rd Qu.:8.150   3rd Qu.:34.63   3rd Qu.: 764.500  
##  Max.   :8.500   Max.   :34.90   Max.   :1921.000  
##
```

## Including Plots

### 3. Histogramas con etiquetas y títulos

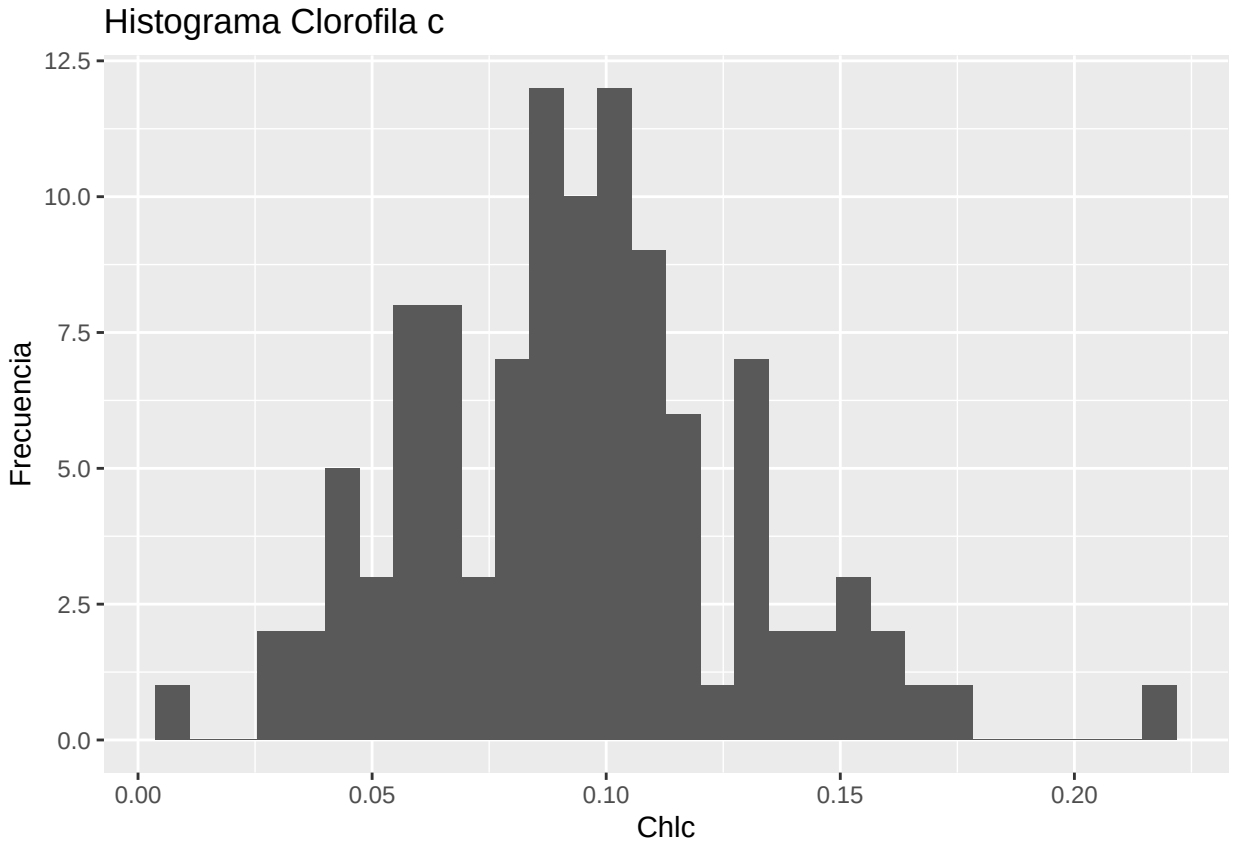
```
ggplot(Datos_Proyecto, aes(Chla)) + geom_histogram()+ labs(title="Histograma Chla", x="Clorofila a", y=
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



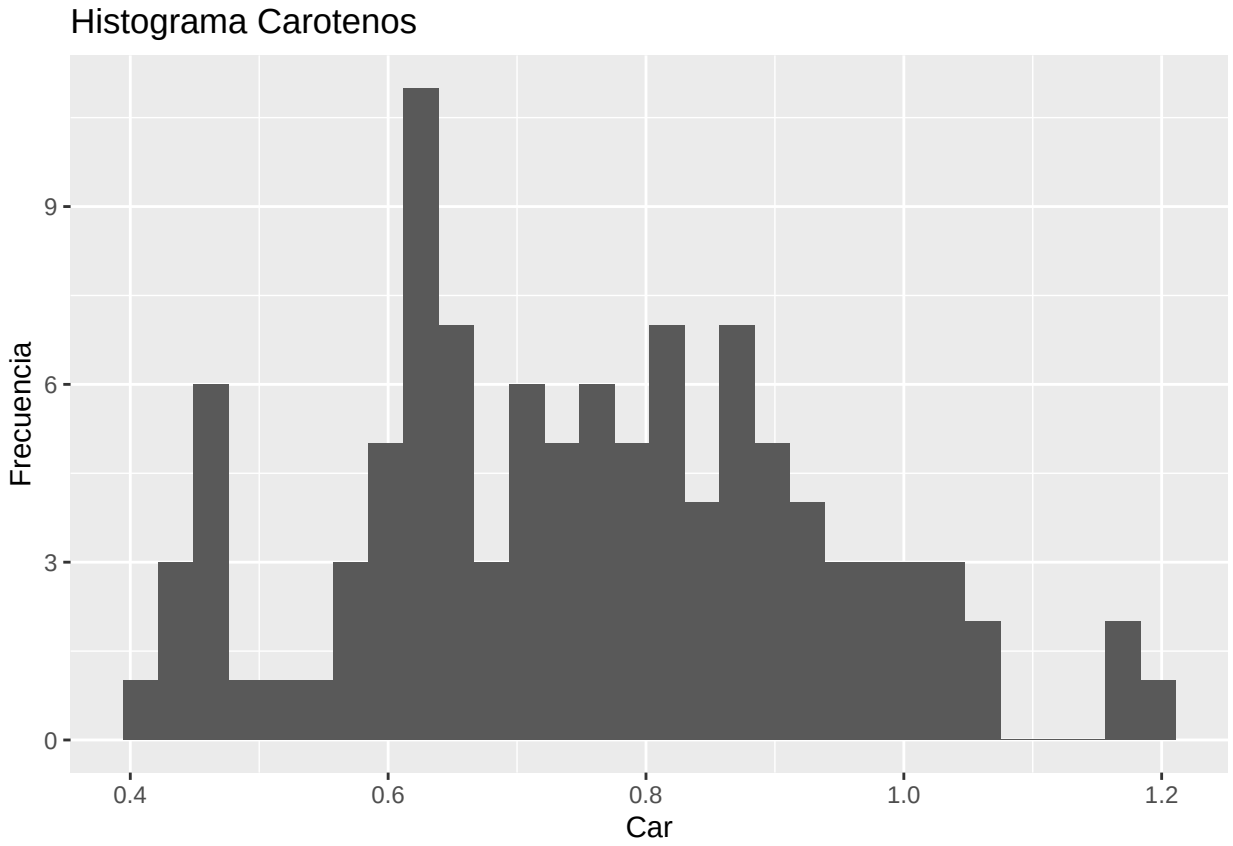

```
ggplot(Datos_Proyecto, aes(Chlc)) + geom_histogram()+ labs(title="Histograma Clorofila c", x="Chlc", y="
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



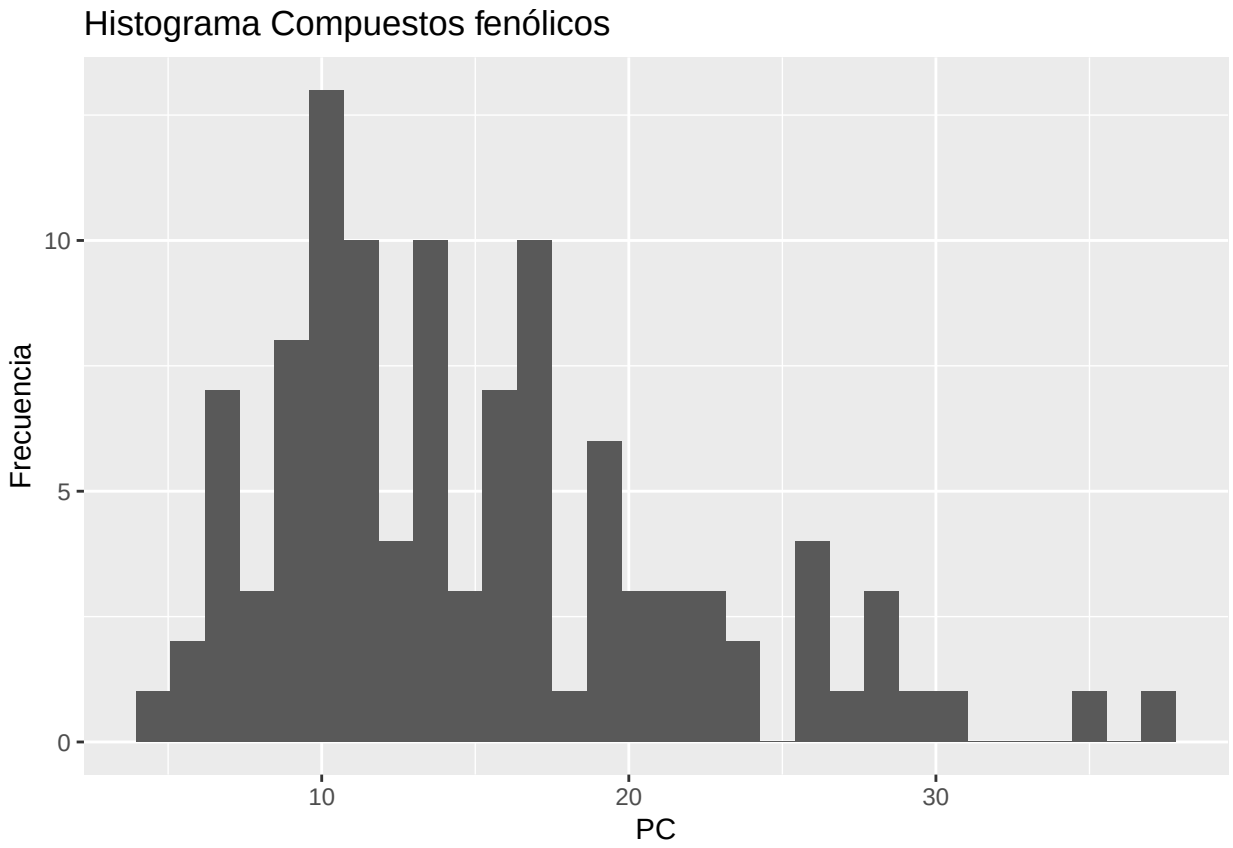

```
ggplot(Datos_Proyecto, aes(Car)) + geom_histogram()+ labs(title="Histograma Carotenos", x="Car", y="Fre
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



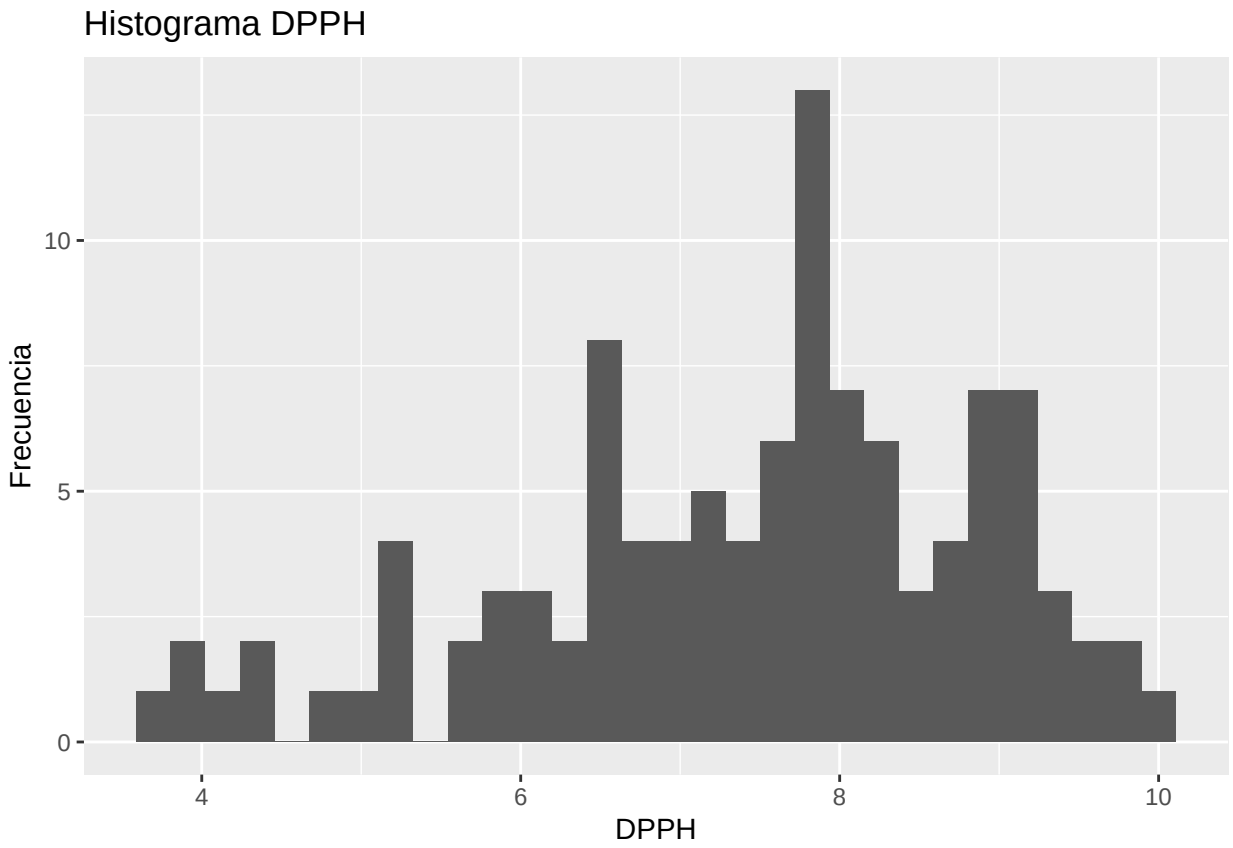

```
ggplot(Datos_Proyecto, aes(PC)) + geom_histogram()+ labs(title="Histograma Compuestos fenólicos", x="PC
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



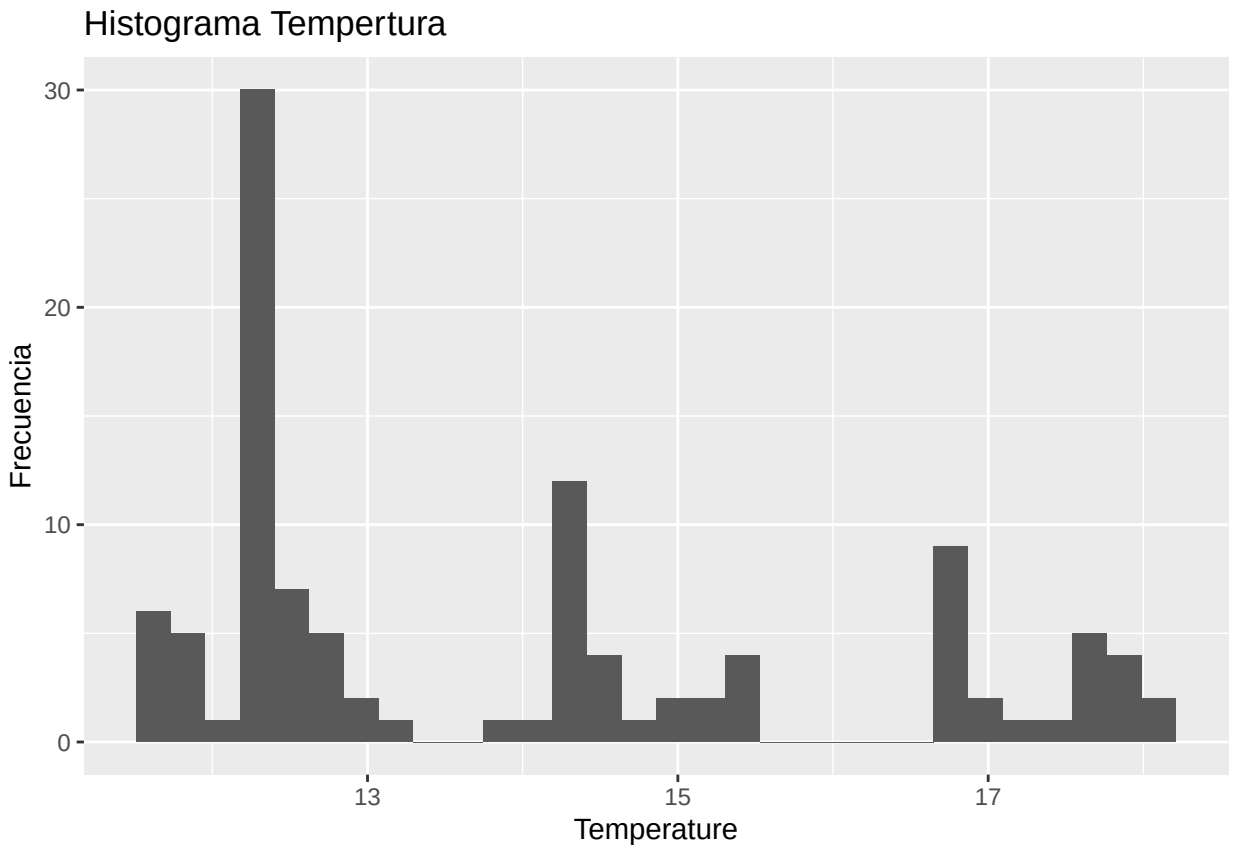

```
ggplot(Datos_Proyecto, aes(DPPH)) + geom_histogram()+ labs(title="Histograma DPPH", x="DPPH", y="Frecue
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



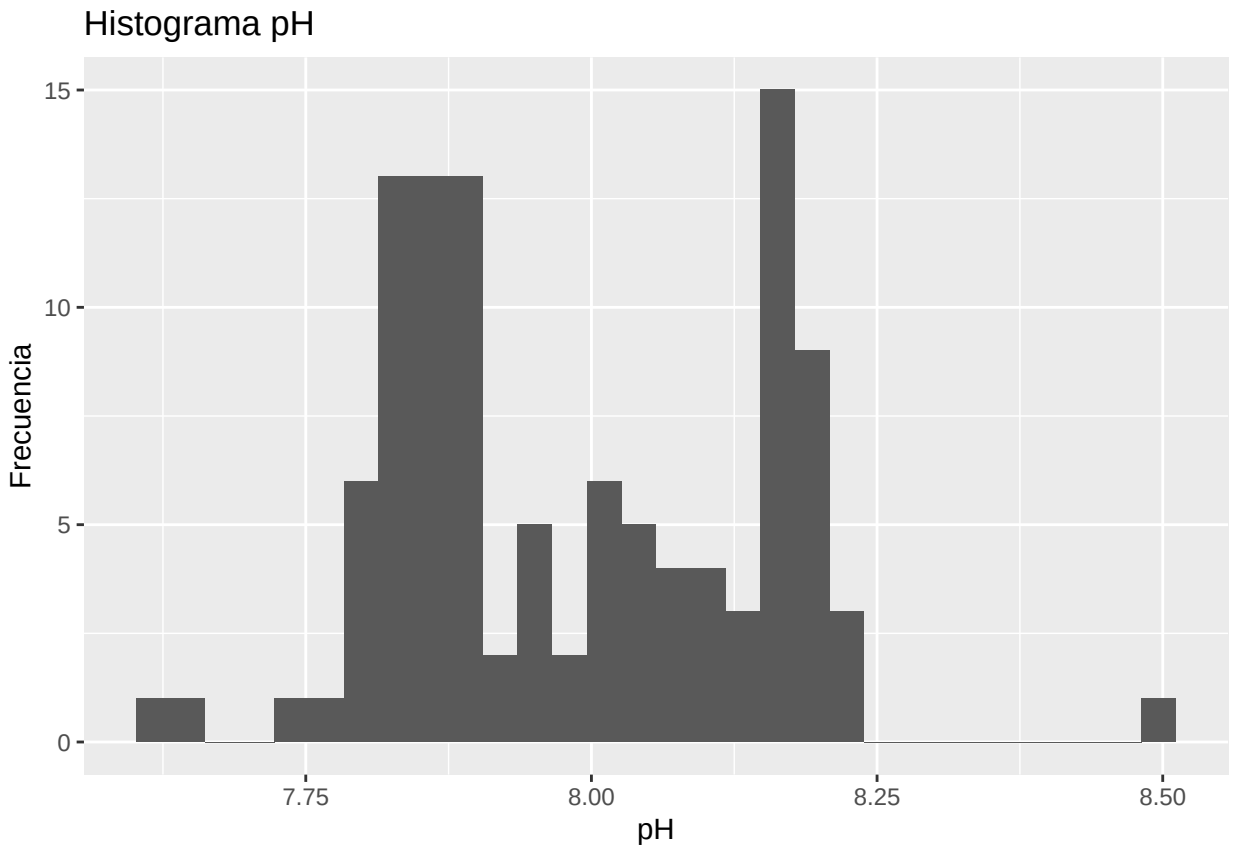

```
ggplot(Datos_Proyecto, aes(Temperature)) + geom_histogram()+ labs(title="Histograma Tempertura", x="Temp
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



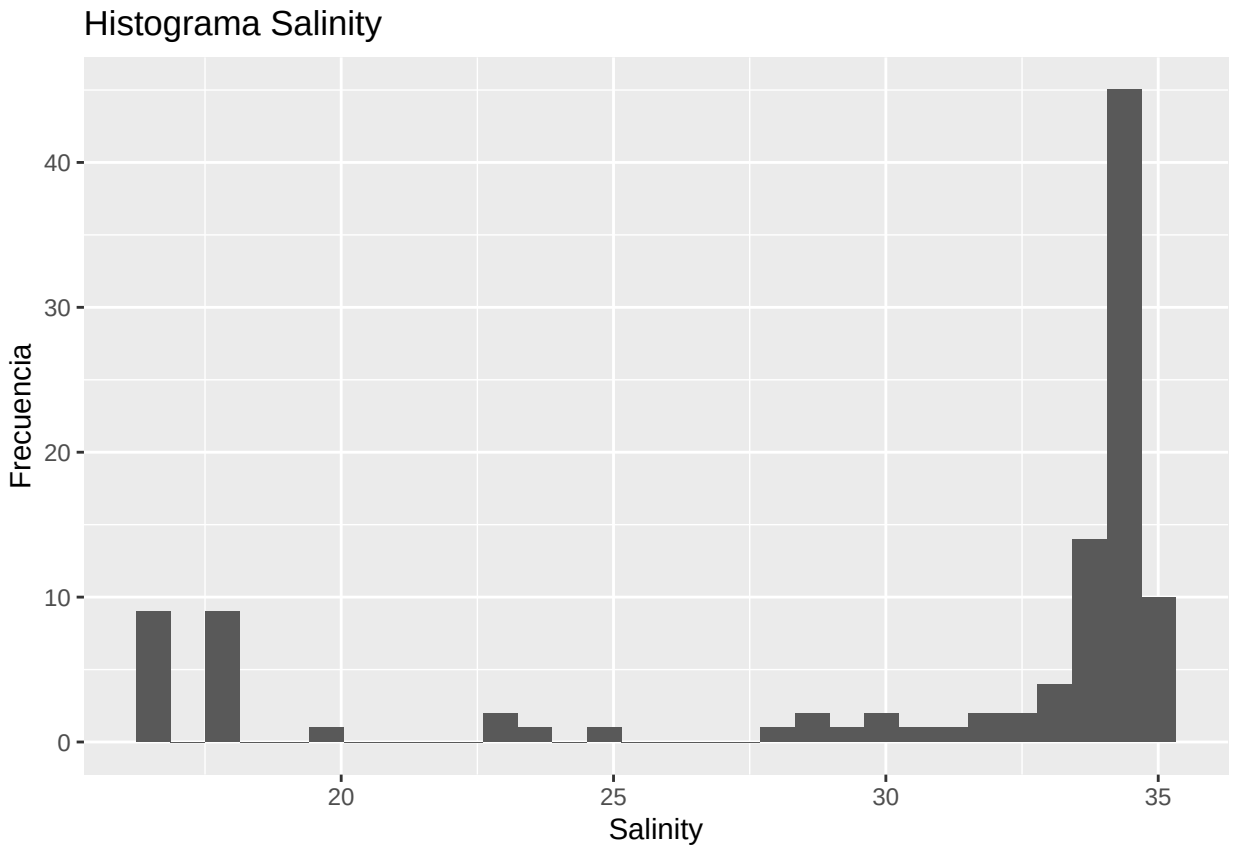

```
ggplot(Datos_Proyecto, aes(pH)) + geom_histogram()+ labs(title="Histograma pH", x="pH", y="Frecuencia")
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



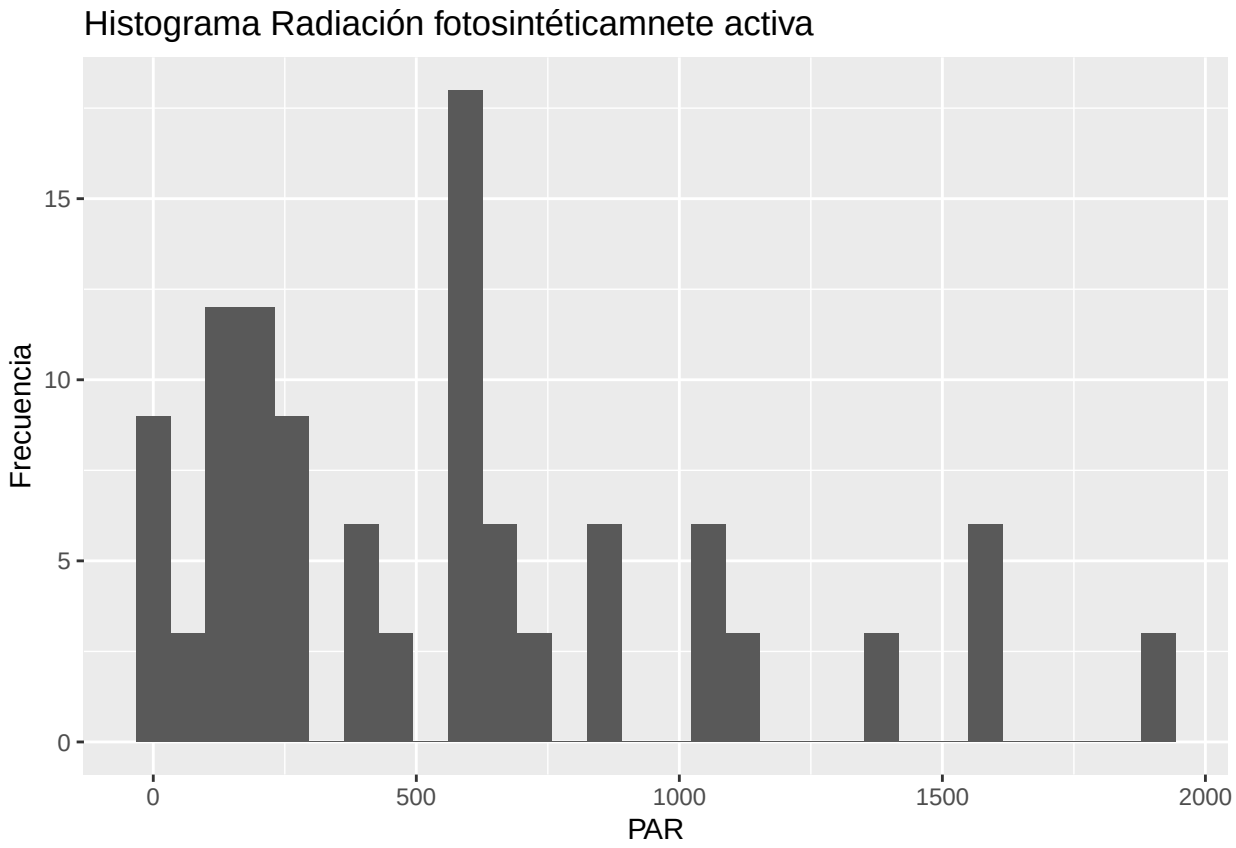

```
ggplot(Datos_Proyecto, aes(Salinity)) + geom_histogram()+ labs(title="Histograma Salinity", x="Salinity
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




```
ggplot(Datos_Proyecto, aes(PAR)) + geom_histogram()+ labs(title="Histograma Radiación fotosintéticamnet
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




## 4. Datos balanceados y tablas de frecuencia

```
str(Datos_Proyecto)
```

```
## tibble [108 x 12] (S3: tbl_df/tbl/data.frame)
##  $ Seasons    : Factor w/ 4 levels "Autumn","Spring",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ time       : Factor w/ 3 levels "day 1","day 2",..: 1 1 1 1 1 1 1 1 1 2 ...
##  $ Replicate  : Factor w/ 9 levels "R1","R2","R3",..: 1 2 3 4 5 6 7 8 9 1 ...
##  $ Chla       : num [1:108] 1.04 1.6 1.52 1.48 1.14 ...
##  $ Chlc       : num [1:108] 0.095 0.155 0.143 0.152 0.108 0.115 0.148 0.105 0.102 0.134 ...
##  $ Car        : num [1:108] 0.605 0.954 0.931 0.905 0.694 0.752 0.884 0.659 0.62 0.937 ...
##  $ PC         : num [1:108] 9.12 13.87 15.83 19.89 19.81 ...
##  $ DPPH       : num [1:108] 7.58 6.08 7.81 7.02 7.2 ...
##  $ Temperature: num [1:108] 12.3 12.3 12.3 12.3 12.3 ...
##  $ pH         : num [1:108] 7.84 7.84 7.84 7.85 7.85 7.85 7.88 7.88 7.88 7.84 ...
##  $ Salinity   : num [1:108] 33.7 33.7 33.7 17.9 17.9 ...
##  $ PAR        : num [1:108] 594 594 594 1563 1563 ...
```

```
Datos_Proyecto$Seasons <- as.factor(Datos_Proyecto$Seasons)
Datos_Proyecto$time <- as.factor(Datos_Proyecto$time)
Datos_Proyecto$Replicate <- as.factor(Datos_Proyecto$Replicate)
summary(Datos_Proyecto)
```

```
##    Seasons      time      Replicate       Chla            Chlc
##  Autumn:27   day 1:36   R1     :12   Min.   :0.6730   Min.   :0.01000
##  Spring:27   day 2:36   R2     :12   1st Qu.:0.9888   1st Qu.:0.06775
##  Summer:27   day 3:36   R3     :12   Median :1.1660   Median :0.09500
```

```
##  Winter:27              R4     :12   Mean   :1.1856   Mean   :0.09365
##                         R5     :12   3rd Qu.:1.3813   3rd Qu.:0.10975
##                         R6     :12   Max.   :1.9690   Max.   :0.22100
##                         (Other):36
##       Car                PC              DPPH         Temperature
##  Min.   :0.4190   Min.   : 4.600   Min.   : 3.792   Min.   :11.54
##  1st Qu.:0.6240   1st Qu.: 9.953   1st Qu.: 6.539   1st Qu.:12.29
##  Median :0.7520   Median :13.815   Median : 7.769   Median :12.88
##  Mean   :0.7557   Mean   :15.153   Mean   : 7.444   Mean   :13.98
##  3rd Qu.:0.8780   3rd Qu.:18.990   3rd Qu.: 8.433   3rd Qu.:15.35
##  Max.   :1.2080   Max.   :37.340   Max.   :10.097   Max.   :18.02
##
##        pH           Salinity          PAR
##  Min.   :7.620   Min.   :16.44   Min.   :   9.768
##  1st Qu.:7.850   1st Qu.:29.62   1st Qu.: 196.000
##  Median :7.960   Median :34.10   Median : 525.793
##  Mean   :7.982   Mean   :30.49   Mean   : 569.983
##  3rd Qu.:8.150   3rd Qu.:34.63   3rd Qu.: 764.500
##  Max.   :8.500   Max.   :34.90   Max.   :1921.000
##
```

```
Datos_Proyecto$Chla
```

```
##   [1] 1.040 1.597 1.521 1.479 1.139 1.166 1.380 1.173 1.084 1.491 1.182 1.256
##  [13] 1.699 1.210 1.547 1.635 0.953 1.677 0.769 0.967 1.166 1.531 1.222 1.385
##  [25] 1.005 1.000 1.176 0.808 0.869 0.883 0.954 0.882 0.826 0.816 0.870 0.929
##  [37] 0.786 0.835 0.855 1.034 1.058 1.245 0.903 0.919 1.006 0.996 0.815 1.108
##  [49] 1.021 1.013 0.808 0.745 1.038 0.825 1.616 1.319 1.036 1.184 0.913 1.298
##  [61] 1.021 1.065 1.118 1.058 1.289 1.063 1.591 1.202 1.526 1.191 1.188 1.140
##  [73] 1.136 1.969 1.611 1.319 1.074 1.414 1.635 1.278 1.839 1.192 1.137 0.936
##  [85] 0.673 1.329 1.555 1.199 1.210 1.009 1.127 1.190 0.864 0.943 1.432 1.322
##  [97] 1.345 1.210 1.400 1.501 1.513 1.310 1.547 1.578 1.558 1.707 0.832 1.040
```

```
tableChla <-as.data.frame(table(Chla = Datos_Proyecto$Chla))
tableChla
```

```
##     Chla Freq
## 1  0.673    1
## 2  0.745    1
## 3  0.769    1
## 4  0.786    1
## 5  0.808    2
## 6  0.815    1
## 7  0.816    1
## 8  0.825    1
## 9  0.826    1
## 10 0.832    1
## 11 0.835    1
## 12 0.855    1
## 13 0.864    1
## 14 0.869    1
## 15  0.87    1
## 16 0.882    1
## 17 0.883    1
## 18 0.903    1
## 19 0.913    1
```

```
## 20 0.919    1
## 21 0.929    1
## 22 0.936    1
## 23 0.943    1
## 24 0.953    1
## 25 0.954    1
## 26 0.967    1
## 27 0.996    1
## 28     1    1
## 29 1.005    1
## 30 1.006    1
## 31 1.009    1
## 32 1.013    1
## 33 1.021    2
## 34 1.034    1
## 35 1.036    1
## 36 1.038    1
## 37  1.04    2
## 38 1.058    2
## 39 1.063    1
## 40 1.065    1
## 41 1.074    1
## 42 1.084    1
## 43 1.108    1
## 44 1.118    1
## 45 1.127    1
## 46 1.136    1
## 47 1.137    1
## 48 1.139    1
## 49  1.14    1
## 50 1.166    2
## 51 1.173    1
## 52 1.176    1
## 53 1.182    1
## 54 1.184    1
## 55 1.188    1
## 56  1.19    1
## 57 1.191    1
## 58 1.192    1
## 59 1.199    1
## 60 1.202    1
## 61  1.21    3
## 62 1.222    1
## 63 1.245    1
## 64 1.256    1
## 65 1.278    1
## 66 1.289    1
## 67 1.298    1
## 68  1.31    1
## 69 1.319    2
## 70 1.322    1
## 71 1.329    1
## 72 1.345    1
## 73  1.38    1
```

```
## 74 1.385    1
## 75   1.4    1
## 76 1.414    1
## 77 1.432    1
## 78 1.479    1
## 79 1.491    1
## 80 1.501    1
## 81 1.513    1
## 82 1.521    1
## 83 1.526    1
## 84 1.531    1
## 85 1.547    2
## 86 1.555    1
## 87 1.558    1
## 88 1.578    1
## 89 1.591    1
## 90 1.597    1
## 91 1.611    1
## 92 1.616    1
## 93 1.635    2
## 94 1.677    1
## 95 1.699    1
## 96 1.707    1
## 97 1.839    1
## 98 1.969    1
```

```
Datos_Proyecto$Chlc
```

```
##   [1] 0.095 0.155 0.143 0.152 0.108 0.115 0.148 0.105 0.102 0.134 0.102 0.117
##  [13] 0.154 0.107 0.158 0.101 0.097 0.166 0.074 0.082 0.100 0.132 0.098 0.129
##  [25] 0.090 0.092 0.112 0.119 0.045 0.102 0.046 0.090 0.130 0.107 0.097 0.088
##  [37] 0.055 0.109 0.010 0.178 0.047 0.029 0.057 0.088 0.081 0.108 0.157 0.086
##  [49] 0.221 0.106 0.034 0.041 0.049 0.033 0.102 0.084 0.067 0.076 0.049 0.081
##  [61] 0.064 0.064 0.062 0.061 0.084 0.069 0.094 0.080 0.095 0.055 0.055 0.051
##  [73] 0.079 0.129 0.103 0.084 0.057 0.097 0.101 0.058 0.107 0.062 0.065 0.042
##  [85] 0.027 0.068 0.095 0.088 0.087 0.080 0.082 0.086 0.075 0.132 0.119 0.107
##  [97] 0.101 0.096 0.102 0.118 0.113 0.101 0.135 0.141 0.131 0.127 0.060 0.085
```

```
tableChlc <-as.data.frame(table(Chlc = Datos_Proyecto$Chlc))
tableChlc
```

```
##     Chlc Freq
## 1   0.01    1
## 2  0.027    1
## 3  0.029    1
## 4  0.033    1
## 5  0.034    1
## 6  0.041    1
## 7  0.042    1
## 8  0.045    1
## 9  0.046    1
## 10 0.047    1
## 11 0.049    2
## 12 0.051    1
## 13 0.055    3
## 14 0.057    2
```

```
## 15 0.058    1
## 16  0.06    1
## 17 0.061    1
## 18 0.062    2
## 19 0.064    2
## 20 0.065    1
## 21 0.067    1
## 22 0.068    1
## 23 0.069    1
## 24 0.074    1
## 25 0.075    1
## 26 0.076    1
## 27 0.079    1
## 28  0.08    2
## 29 0.081    2
## 30 0.082    2
## 31 0.084    3
## 32 0.085    1
## 33 0.086    2
## 34 0.087    1
## 35 0.088    3
## 36  0.09    2
## 37 0.092    1
## 38 0.094    1
## 39 0.095    3
## 40 0.096    1
## 41 0.097    3
## 42 0.098    1
## 43   0.1    1
## 44 0.101    4
## 45 0.102    5
## 46 0.103    1
## 47 0.105    1
## 48 0.106    1
## 49 0.107    4
## 50 0.108    2
## 51 0.109    1
## 52 0.112    1
## 53 0.113    1
## 54 0.115    1
## 55 0.117    1
## 56 0.118    1
## 57 0.119    2
## 58 0.127    1
## 59 0.129    2
## 60  0.13    1
## 61 0.131    1
## 62 0.132    2
## 63 0.134    1
## 64 0.135    1
## 65 0.141    1
## 66 0.143    1
## 67 0.148    1
## 68 0.152    1
```

```
## 69 0.154    1
## 70 0.155    1
## 71 0.157    1
## 72 0.158    1
## 73 0.166    1
## 74 0.178    1
## 75 0.221    1
```

```
Datos_Proyecto$Car
```

```
##   [1] 0.605 0.954 0.931 0.905 0.694 0.752 0.884 0.659 0.620 0.937 0.797 0.765
##  [13] 1.026 0.746 0.866 1.031 0.626 1.067 0.511 0.695 0.743 0.910 0.733 0.828
##  [25] 0.624 0.632 0.782 0.617 0.703 0.453 0.641 0.452 0.558 0.419 0.443 0.460
##  [37] 0.669 0.438 0.503 0.635 0.621 0.752 0.813 0.547 0.824 0.584 0.469 0.673
##  [49] 0.609 0.568 0.660 0.461 0.590 0.435 0.988 0.797 0.624 0.804 0.643 0.865
##  [61] 0.614 0.645 0.724 0.671 0.820 0.665 0.978 0.715 1.016 0.865 0.848 0.790
##  [73] 0.631 1.161 0.990 0.824 0.695 0.957 1.056 0.835 1.208 0.767 0.755 0.623
##  [85] 0.459 0.874 1.007 0.876 0.903 0.722 0.832 0.813 0.589 0.649 0.937 0.854
##  [97] 0.906 0.787 0.921 0.860 0.897 0.760 0.962 1.007 1.044 1.172 0.586 0.707
```

```
tableCar <-as.data.frame(table(Car = Datos_Proyecto$Car))
tableCar
```

```
##      Car Freq
## 1  0.419    1
## 2  0.435    1
## 3  0.438    1
## 4  0.443    1
## 5  0.452    1
## 6  0.453    1
## 7  0.459    1
## 8   0.46    1
## 9  0.461    1
## 10 0.469    1
## 11 0.503    1
## 12 0.511    1
## 13 0.547    1
## 14 0.558    1
## 15 0.568    1
## 16 0.584    1
## 17 0.586    1
## 18 0.589    1
## 19  0.59    1
## 20 0.605    1
## 21 0.609    1
## 22 0.614    1
## 23 0.617    1
## 24  0.62    1
## 25 0.621    1
## 26 0.623    1
## 27 0.624    2
## 28 0.626    1
## 29 0.631    1
## 30 0.632    1
## 31 0.635    1
## 32 0.641    1
```

```
## 33 0.643    1
## 34 0.645    1
## 35 0.649    1
## 36 0.659    1
## 37  0.66    1
## 38 0.665    1
## 39 0.669    1
## 40 0.671    1
## 41 0.673    1
## 42 0.694    1
## 43 0.695    2
## 44 0.703    1
## 45 0.707    1
## 46 0.715    1
## 47 0.722    1
## 48 0.724    1
## 49 0.733    1
## 50 0.743    1
## 51 0.746    1
## 52 0.752    2
## 53 0.755    1
## 54  0.76    1
## 55 0.765    1
## 56 0.767    1
## 57 0.782    1
## 58 0.787    1
## 59  0.79    1
## 60 0.797    2
## 61 0.804    1
## 62 0.813    2
## 63  0.82    1
## 64 0.824    2
## 65 0.828    1
## 66 0.832    1
## 67 0.835    1
## 68 0.848    1
## 69 0.854    1
## 70  0.86    1
## 71 0.865    2
## 72 0.866    1
## 73 0.874    1
## 74 0.876    1
## 75 0.884    1
## 76 0.897    1
## 77 0.903    1
## 78 0.905    1
## 79 0.906    1
## 80  0.91    1
## 81 0.921    1
## 82 0.931    1
## 83 0.937    2
## 84 0.954    1
## 85 0.957    1
## 86 0.962    1
```

```
## 87 0.978    1
## 88 0.988    1
## 89  0.99    1
## 90 1.007    2
## 91 1.016    1
## 92 1.026    1
## 93 1.031    1
## 94 1.044    1
## 95 1.056    1
## 96 1.067    1
## 97 1.161    1
## 98 1.172    1
## 99 1.208    1
```

```
Datos_Proyecto$PC
```

```
##   [1]  9.12 13.87 15.83 19.89 19.81 21.64 30.43 14.70 15.98 20.06 24.07 16.94
##  [13] 18.67 21.74 16.66 19.53 26.15 16.97  9.63  9.70 10.04 13.76 11.84 11.30
##  [25]  9.53 13.38 15.32 11.17 12.57 11.20 11.78 12.88 10.74  6.34 10.41 14.02
##  [37]  6.62  9.97  7.35 13.14 17.24 14.00 15.51 14.16 15.73 16.33 13.34 12.10
##  [49]  9.32  9.82  8.37 10.50  7.27  9.00  7.32  6.35  7.05  4.60  5.19 10.54
##  [61]  9.90  9.75 12.52 11.50 19.73  7.55 10.54  9.48 11.27 16.76 16.95 14.44
##  [73]  6.86 11.37  8.65 25.70 19.29 22.64  6.04  9.30  9.54 13.42 17.88 16.61
##  [85] 13.62 13.93 16.60 34.56 28.47 26.34 28.63 28.26 22.67 18.89 17.17 21.74
##  [97] 28.92 23.36 37.34  9.68 10.38 11.36 15.97 23.08 25.76 26.75 17.35 19.51
```

```
tablePC <-as.data.frame(table(PC = Datos_Proyecto$PC))
tablePC
```

```
##        PC Freq
## 1     4.6    1
## 2    5.19    1
## 3    6.04    1
## 4    6.34    1
## 5    6.35    1
## 6    6.62    1
## 7    6.86    1
## 8    7.05    1
## 9    7.27    1
## 10   7.32    1
## 11   7.35    1
## 12   7.55    1
## 13   8.37    1
## 14   8.65    1
## 15      9    1
## 16   9.12    1
## 17    9.3    1
## 18   9.32    1
## 19   9.48    1
## 20   9.53    1
## 21   9.54    1
## 22   9.63    1
## 23   9.68    1
## 24    9.7    1
## 25   9.75    1
## 26   9.82    1
```

```
## 27    9.9    1
## 28   9.97    1
## 29  10.04    1
## 30  10.38    1
## 31  10.41    1
## 32   10.5    1
## 33  10.54    2
## 34  10.74    1
## 35  11.17    1
## 36   11.2    1
## 37  11.27    1
## 38   11.3    1
## 39  11.36    1
## 40  11.37    1
## 41   11.5    1
## 42  11.78    1
## 43  11.84    1
## 44   12.1    1
## 45  12.52    1
## 46  12.57    1
## 47  12.88    1
## 48  13.14    1
## 49  13.34    1
## 50  13.38    1
## 51  13.42    1
## 52  13.62    1
## 53  13.76    1
## 54  13.87    1
## 55  13.93    1
## 56     14    1
## 57  14.02    1
## 58  14.16    1
## 59  14.44    1
## 60   14.7    1
## 61  15.32    1
## 62  15.51    1
## 63  15.73    1
## 64  15.83    1
## 65  15.97    1
## 66  15.98    1
## 67  16.33    1
## 68   16.6    1
## 69  16.61    1
## 70  16.66    1
## 71  16.76    1
## 72  16.94    1
## 73  16.95    1
## 74  16.97    1
## 75  17.17    1
## 76  17.24    1
## 77  17.35    1
## 78  17.88    1
## 79  18.67    1
## 80  18.89    1
```

```
## 81  19.29    1
## 82  19.51    1
## 83  19.53    1
## 84  19.73    1
## 85  19.81    1
## 86  19.89    1
## 87  20.06    1
## 88  21.64    1
## 89  21.74    2
## 90  22.64    1
## 91  22.67    1
## 92  23.08    1
## 93  23.36    1
## 94  24.07    1
## 95   25.7    1
## 96  25.76    1
## 97  26.15    1
## 98  26.34    1
## 99  26.75    1
## 100 28.26    1
## 101 28.47    1
## 102 28.63    1
## 103 28.92    1
## 104 30.43    1
## 105 34.56    1
## 106 37.34    1
```

```
Datos_Proyecto$DPPH
```

```
##   [1]  7.577619  6.084712  7.812297  7.015315  7.201112  5.119478  6.236736
##   [8]  6.470628  6.376712  4.073155  7.845322  7.583337  7.908261  8.899032
##  [15]  6.813768  5.190382  8.967073  6.553575  7.879030  8.096631  8.696681
##  [22]  7.791584  6.538016  5.285725  8.259253  9.106009  8.657348  6.528569
##  [29]  7.284957  6.951946  7.674882  7.923461  7.962869  6.470648  7.388045
##  [36]  7.325970  5.551967  5.901315  5.965841  8.367213  8.201024  8.399609
##  [43]  7.418215  7.926512  7.178267  6.595440  4.375118  8.674017  8.066500
##  [50]  8.925602  9.084461  6.153443  8.345454  7.795784  5.701777  5.262799
##  [57]  3.948226  3.833870  3.792109  4.963813  7.114410  7.086409  7.745987
##  [64]  6.765577  6.888801  6.467177  6.818926  9.133867  7.647086  8.882152
##  [71]  8.080329  8.143273  4.343945  7.838153  5.807068  7.130447  8.804655
##  [78]  9.812655  6.119257  7.580932  4.730263  9.864639  9.616306 10.096986
##  [85]  9.066688  9.130485  8.372641  8.533433  9.463085  6.538878  7.844437
##  [92]  7.882420  8.984493  6.900315  7.812050  7.537598  8.095900  9.076124
##  [99]  6.758803  9.079230  9.332209  8.340027  9.282829  9.304817  8.981271
## [106]  8.906240  8.156935  8.045335
```

```
tableDPPH <-as.data.frame(table(DPPH = Datos_Proyecto$DPPH))
tableDPPH
```

```
##                 DPPH Freq
## 1    3.7921091487048    1
## 2   3.83386983732118    1
## 3   3.94822628290414    1
## 4   4.07315491016667    1
## 5   4.34394543819923    1
## 6   4.37511757369667    1
```

```
## 7   4.73026296031757    1
## 8   4.96381302541734    1
## 9    5.1194784378545    1
## 10  5.19038236694484    1
## 11  5.26279857279554    1
## 12  5.28572544493435    1
## 13  5.55196731924744    1
## 14  5.70177684116028    1
## 15   5.8070681644718    1
## 16  5.90131463394357    1
## 17  5.96584130019852    1
## 18  6.08471171781293    1
## 19  6.11925664673893    1
## 20  6.15344293599768    1
## 21  6.23673572752751    1
## 22  6.37671184950451    1
## 23   6.4671773936417    1
## 24  6.47062777818111    1
## 25  6.47064767825994    1
## 26  6.52856916357015    1
## 27  6.53801630112277    1
## 28  6.53887774696075    1
## 29  6.55357474292809    1
## 30  6.59544000293789    1
## 31  6.75880275621157    1
## 32  6.76557744492377    1
## 33  6.81376807198535    1
## 34  6.81892550440379    1
## 35  6.88880073443357    1
## 36  6.90031501583034    1
## 37  6.95194609308745    1
## 38  7.01531486776157    1
## 39  7.08640909495452    1
## 40  7.11441001985266    1
## 41  7.13044683746743    1
## 42  7.17826668387887    1
## 43  7.20111198374913    1
## 44  7.28495721947921    1
## 45  7.32596996180665    1
## 46   7.3880453432457    1
## 47  7.41821472683629    1
## 48  7.53759848818543    1
## 49  7.57761861614438    1
## 50  7.58093204253681    1
## 51  7.58333744979186    1
## 52  7.64708630985723    1
## 53  7.67488209576931    1
## 54  7.74598658508453    1
## 55  7.79158426429331    1
## 56  7.79578363292874    1
## 57  7.81205032442958    1
## 58  7.81229693476463    1
## 59  7.83815304355675    1
## 60   7.8444370360342    1
```

```
## 61  7.84532151099326    1
## 62  7.87903013092856    1
## 63  7.88242034424958    1
## 64  7.90826123438925    1
## 65  7.92346109756698    1
## 66  7.92651169747938    1
## 67  7.96286949555254    1
## 68   8.0453346445548    1
## 69  8.06649986730547    1
## 70   8.0803288577418    1
## 71  8.09590000250503    1
## 72  8.09663070958325    1
## 73  8.14327334588672    1
## 74  8.15693463388017    1
## 75  8.20102375293735    1
## 76  8.25925298394825    1
## 77  8.34002719005116    1
## 78  8.34545377528216    1
## 79  8.36721344084489    1
## 80  8.37264084101011    1
## 81  8.39960941129238    1
## 82  8.53343299621107    1
## 83  8.65734800174523    1
## 84  8.67401723119002    1
## 85  8.69668123896576    1
## 86  8.80465504054987    1
## 87  8.88215196259132    1
## 88  8.89903180720949    1
## 89  8.90623955108464    1
## 90  8.92560217841661    1
## 91  8.96707301649087    1
## 92  8.98127144216437    1
## 93  8.98449281324139    1
## 94  9.06668762571664    1
## 95  9.07612448459151    1
## 96   9.0792302344551    1
## 97  9.08446116671832    1
## 98  9.10600868735363    1
## 99  9.13048519777377    1
## 100 9.13386697153185    1
## 101 9.28282925475416    1
## 102 9.30481657147222    1
## 103  9.3322087818022    1
## 104  9.4630849489861    1
## 105 9.61630593483038    1
## 106 9.81265544853422    1
## 107 9.86463936386016    1
## 108 10.0969856269446    1
```

```
Datos_Proyecto$Temperature
```

```
##   [1] 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29
##  [13] 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29 12.29
##  [25] 12.29 12.29 12.29 11.54 11.55 11.57 12.29 12.60 12.23 11.96 11.92 11.92
##  [37] 11.68 11.67 11.71 12.47 12.46 12.27 12.73 12.76 12.73 11.87 11.81 11.88
```

```
##  [49] 12.72 12.66 12.61 12.58 12.43 12.45 13.01 13.12 13.05 14.31 14.57 14.54
##  [61] 14.43 14.38 14.33 13.80 14.03 14.49 15.18 15.34 15.37 15.45 15.25 15.49
##  [73] 14.94 14.82 14.94 17.21 17.01 16.95 17.70 17.49 17.72 14.33 14.32 14.33
##  [85] 16.77 16.73 16.83 17.80 17.84 17.84 14.23 14.23 14.22 16.76 16.73 16.74
##  [97] 17.71 17.99 18.02 14.28 14.27 14.28 16.81 16.81 16.79 17.76 17.80 17.73
```

```
tableTemp <-as.data.frame(table(Temperature = Datos_Proyecto$Temperature))
tableTemp
```

```
##    Temperature Freq
## 1        11.54    1
## 2        11.55    1
## 3        11.57    1
## 4        11.67    1
## 5        11.68    1
## 6        11.71    1
## 7        11.81    1
## 8        11.87    1
## 9        11.88    1
## 10       11.92    2
## 11       11.96    1
## 12       12.23    1
## 13       12.27    1
## 14       12.29   28
## 15       12.43    1
## 16       12.45    1
## 17       12.46    1
## 18       12.47    1
## 19       12.58    1
## 20        12.6    1
## 21       12.61    1
## 22       12.66    1
## 23       12.72    1
## 24       12.73    2
## 25       12.76    1
## 26       13.01    1
## 27       13.05    1
## 28       13.12    1
## 29        13.8    1
## 30       14.03    1
## 31       14.22    1
## 32       14.23    2
## 33       14.27    1
## 34       14.28    2
## 35       14.31    1
## 36       14.32    1
## 37       14.33    3
## 38       14.38    1
## 39       14.43    1
## 40       14.49    1
## 41       14.54    1
## 42       14.57    1
## 43       14.82    1
## 44       14.94    2
## 45       15.18    1
```

```
## 46       15.25    1
## 47       15.34    1
## 48       15.37    1
## 49       15.45    1
## 50       15.49    1
## 51       16.73    2
## 52       16.74    1
## 53       16.76    1
## 54       16.77    1
## 55       16.79    1
## 56       16.81    2
## 57       16.83    1
## 58       16.95    1
## 59       17.01    1
## 60       17.21    1
## 61       17.49    1
## 62        17.7    1
## 63       17.71    1
## 64       17.72    1
## 65       17.73    1
## 66       17.76    1
## 67        17.8    2
## 68       17.84    2
## 69       17.99    1
## 70       18.02    1
```

```
Datos_Proyecto$pH
```

```
##   [1] 7.84 7.84 7.84 7.85 7.85 7.85 7.88 7.88 7.88 7.84 7.84 7.84 7.85 7.85 7.85
##  [16] 7.88 7.88 7.88 7.84 7.84 7.84 7.85 7.85 7.85 7.88 7.88 7.88 7.80 7.87 7.88
##  [31] 7.96 7.94 7.94 8.12 8.01 7.97 7.89 7.92 7.93 8.03 8.03 8.01 8.01 8.00 8.00
##  [46] 7.87 7.85 7.87 7.96 7.97 7.96 8.07 8.03 8.02 7.74 7.89 7.90 8.09 8.10 8.10
##  [61] 8.23 8.23 8.23 7.77 7.62 7.66 8.50 8.05 8.04 8.12 8.10 8.12 8.06 8.08 8.07
##  [76] 8.15 8.15 8.15 8.17 8.17 8.15 7.80 7.81 7.81 8.16 8.17 8.16 8.18 8.18 8.18
##  [91] 7.81 7.81 7.82 8.16 8.16 8.16 8.18 8.18 8.18 7.82 7.82 7.82 8.16 8.16 8.16
## [106] 8.18 8.18 8.18
```

```
tablepH <-as.data.frame(table(pH = Datos_Proyecto$pH))
tablepH
```

```
##      pH Freq
## 1  7.62    1
## 2  7.66    1
## 3  7.74    1
## 4  7.77    1
## 5   7.8    2
## 6  7.81    4
## 7  7.82    4
## 8  7.84    9
## 9  7.85   10
## 10 7.87    3
## 11 7.88   10
## 12 7.89    2
## 13  7.9    1
## 14 7.92    1
```

```
## 15 7.93    1
## 16 7.94    2
## 17 7.96    3
## 18 7.97    2
## 19    8    2
## 20 8.01    3
## 21 8.02    1
## 22 8.03    3
## 23 8.04    1
## 24 8.05    1
## 25 8.06    1
## 26 8.07    2
## 27 8.08    1
## 28 8.09    1
## 29  8.1    3
## 30 8.12    3
## 31 8.15    4
## 32 8.16    8
## 33 8.17    3
## 34 8.18    9
## 35 8.23    3
## 36  8.5    1
```

```
Datos_Proyecto$Salinity
```

```
##   [1] 33.74000 33.74000 33.74000 17.87000 17.87000 17.87000 16.44000 16.44000
##   [9] 16.44000 33.74000 33.74000 33.74000 17.87000 17.87000 17.87000 16.44000
##  [17] 16.44000 16.44000 33.74000 33.74000 33.74000 17.87000 17.87000 17.87000
##  [25] 16.44000 16.44000 16.44000 33.63000 28.76000 30.61000 31.02000 34.38000
##  [33] 29.75000 32.57000 20.05000 33.56000 33.11000 22.72000 24.55000 33.09000
##  [41] 31.89000 31.95000 32.22000 23.33000 33.84000 29.87000 33.59000 22.73000
##  [49] 27.88000 33.31000 34.27000 29.23000 34.33000 32.92000 33.74000 34.58000
##  [57] 34.10000 28.90000 34.45000 34.29000 34.57000 34.74000 34.62000 34.90000
##  [65] 34.60000 34.50000 34.10000 34.42000 34.54000 34.73000 34.60000 34.63000
##  [73] 34.52000 34.67000 34.67000 34.54000 34.63000 34.66000 34.57000 34.75000
##  [81] 34.66000 34.74265 34.68162 34.69101 34.54237 34.64999 34.52648 34.71626
##  [89] 34.64201 34.74114 34.10688 34.66292 34.63660 34.60394 34.65577 34.67205
##  [97] 34.71561 34.72834 34.72259 34.64873 34.68386 34.66909 34.48028 34.48028
## [105] 34.55885 34.40823 34.30854 34.69048
```

```
tableSalinity <-as.data.frame(table(Salinity = Datos_Proyecto$Salinity))
tableSalinity
```

```
##            Salinity Freq
## 1             16.44    9
## 2             17.87    9
## 3             20.05    1
## 4             22.72    1
## 5             22.73    1
## 6             23.33    1
## 7             24.55    1
## 8             27.88    1
## 9             28.76    1
## 10             28.9    1
## 11            29.23    1
```

```
## 12            29.75    1
## 13            29.87    1
## 14            30.61    1
## 15            31.02    1
## 16            31.89    1
## 17            31.95    1
## 18            32.22    1
## 19            32.57    1
## 20            32.92    1
## 21            33.09    1
## 22            33.11    1
## 23            33.31    1
## 24            33.56    1
## 25            33.59    1
## 26            33.63    1
## 27            33.74   10
## 28            33.84    1
## 29             34.1    2
## 30  34.106876373291    1
## 31            34.27    1
## 32            34.29    1
## 33 34.3085403442383    1
## 34            34.33    1
## 35            34.38    1
## 36 34.4082298278809    1
## 37            34.42    1
## 38            34.45    1
## 39 34.4802780151367    2
## 40             34.5    1
## 41            34.52    1
## 42  34.526481628418    1
## 43            34.54    2
## 44  34.542366027832    1
## 45 34.5588531494141    1
## 46            34.57    2
## 47            34.58    1
## 48             34.6    2
## 49 34.6039352416992    1
## 50            34.62    1
## 51            34.63    2
## 52 34.6365966796875    1
## 53 34.6420097351074    1
## 54 34.6487312316895    1
## 55 34.6499938964844    1
## 56 34.6557655334473    1
## 57            34.66    2
## 58 34.6629180908203    1
## 59 34.6690940856934    1
## 60            34.67    2
## 61 34.6720542907715    1
## 62 34.6816215515137    1
## 63 34.6838569641113    1
## 64 34.6904830932617    1
## 65 34.6910133361816    1
```

```
## 66 34.7156066894531    1
## 67 34.7162590026855    1
## 68 34.7225875854492    1
## 69 34.7283363342285    1
## 70            34.73    1
## 71            34.74    1
## 72 34.7411422729492    1
## 73 34.7426490783691    1
## 74            34.75    1
## 75             34.9    1
```

```
Datos_Proyecto$PAR
```

```
##   [1]  593.98700  593.98700  593.98700 1562.99667 1562.99667 1562.99667
##   [7]  210.44448  210.44448  210.44448  462.75900  462.75900  462.75900
##  [13] 1562.96000 1562.96000 1562.96000  408.04300  408.04300  408.04300
##  [19]   75.39680   75.39680   75.39680  743.66600  743.66600  743.66600
##  [25]  118.59000  118.59000  118.59000  603.63200  603.63200  603.63200
##  [31] 1054.56000 1054.56000 1054.56000    9.76801    9.76801    9.76801
##  [37]  588.82800  588.82800  588.82800 1067.00000 1067.00000 1067.00000
##  [43]   10.37850   10.37850   10.37850  242.21600  242.21600  242.21600
##  [49]  842.72000  842.72000  842.72000   12.43890   12.43890   12.43890
##  [55]  198.00000  198.00000  198.00000 1118.00000 1118.00000 1118.00000
##  [61]  624.00000  624.00000  624.00000  126.00000  126.00000  126.00000
##  [67]  827.00000  827.00000  827.00000  605.00000  605.00000  605.00000
##  [73]  134.00000  134.00000  134.00000 1921.00000 1921.00000 1921.00000
##  [79]  648.00000  648.00000  648.00000  292.00000  292.00000  292.00000
##  [85] 1411.00000 1411.00000 1411.00000  368.00000  368.00000  368.00000
##  [91]  121.00000  121.00000  121.00000  658.00000  658.00000  658.00000
##  [97]  287.00000  287.00000  287.00000  201.00000  201.00000  201.00000
## [103]  620.00000  620.00000  620.00000  190.00000  190.00000  190.00000
```

```
tablePAR <-as.data.frame(table(PAR = Datos_Proyecto$PAR))
tablePAR
```

```
##                PAR Freq
## 1          9.76801    3
## 2          10.3785    3
## 3          12.4389    3
## 4          75.3968    3
## 5           118.59    3
## 6              121    3
## 7              126    3
## 8              134    3
## 9              190    3
## 10             198    3
## 11             201    3
## 12 210.444483333333    3
## 13         242.216    3
## 14             287    3
## 15             292    3
## 16             368    3
## 17         408.043    3
## 18         462.759    3
## 19         588.828    3
## 20         593.987    3
```

```
## 21          603.632    3
## 22              605    3
## 23              620    3
## 24              624    3
## 25              648    3
## 26              658    3
## 27          743.666    3
## 28              827    3
## 29           842.72    3
## 30          1054.56    3
## 31             1067    3
## 32             1118    3
## 33             1411    3
## 34          1562.96    3
## 35 1562.99666666667    3
## 36             1921    3
```

## 5. Relación entre variables cuantitativas y factores

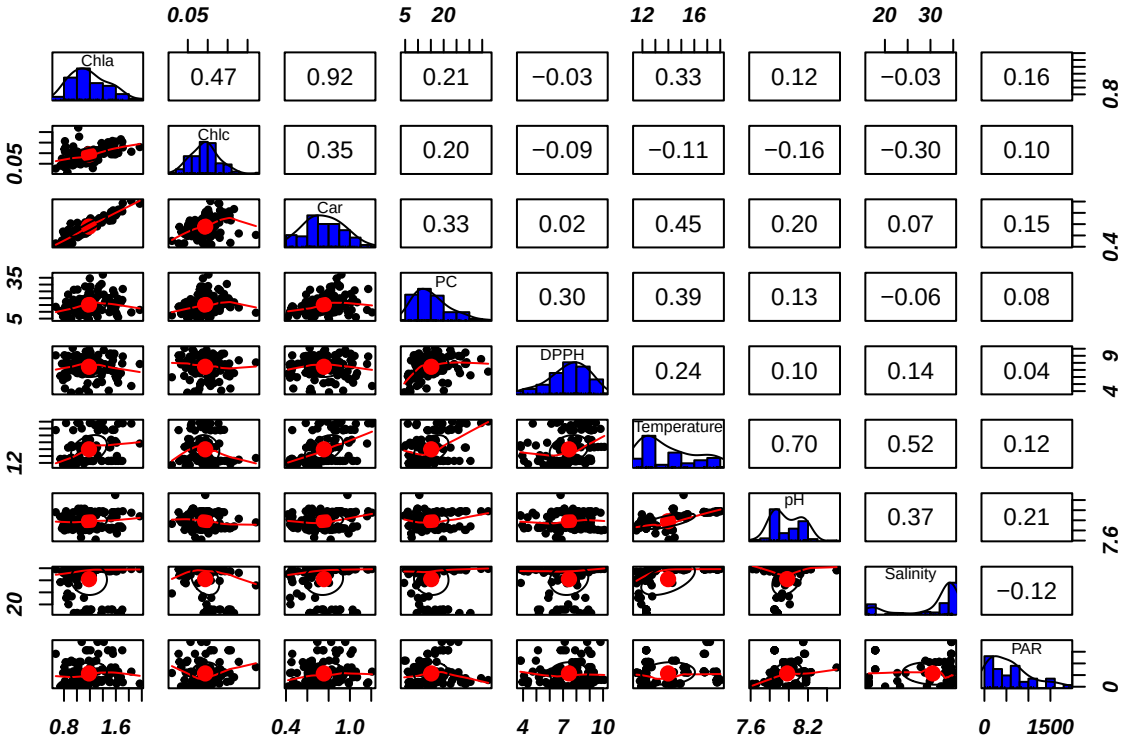
** No se incluiran las variables Seasons, time, y Replicate porque son variables categóricas.

```
summary(Datos_Proyecto)
```

```
##    Seasons      time      Replicate       Chla             Chlc        
##  Autumn:27   day 1:36   R1     :12   Min.   :0.6730   Min.   :0.01000  
##  Spring:27   day 2:36   R2     :12   1st Qu.:0.9888   1st Qu.:0.06775  
##  Summer:27   day 3:36   R3     :12   Median :1.1660   Median :0.09500  
##  Winter:27              R4     :12   Mean   :1.1856   Mean   :0.09365  
##                         R5     :12   3rd Qu.:1.3813   3rd Qu.:0.10975  
##                         R6     :12   Max.   :1.9690   Max.   :0.22100  
##                         (Other):36                                     
##       Car                PC              DPPH         Temperature    
##  Min.   :0.4190   Min.   : 4.600   Min.   : 3.792   Min.   :11.54  
##  1st Qu.:0.6240   1st Qu.: 9.953   1st Qu.: 6.539   1st Qu.:12.29  
##  Median :0.7520   Median :13.815   Median : 7.769   Median :12.88  
##  Mean   :0.7557   Mean   :15.153   Mean   : 7.444   Mean   :13.98  
##  3rd Qu.:0.8780   3rd Qu.:18.990   3rd Qu.: 8.433   3rd Qu.:15.35  
##  Max.   :1.2080   Max.   :37.340   Max.   :10.097   Max.   :18.02  
##                                                                     
##        pH           Salinity          PAR          
##  Min.   :7.620   Min.   :16.44   Min.   :   9.768  
##  1st Qu.:7.850   1st Qu.:29.62   1st Qu.: 196.000  
##  Median :7.960   Median :34.10   Median : 525.793  
##  Mean   :7.982   Mean   :30.49   Mean   : 569.983  
##  3rd Qu.:8.150   3rd Qu.:34.63   3rd Qu.: 764.500  
##  Max.   :8.500   Max.   :34.90   Max.   :1921.000  
##
```

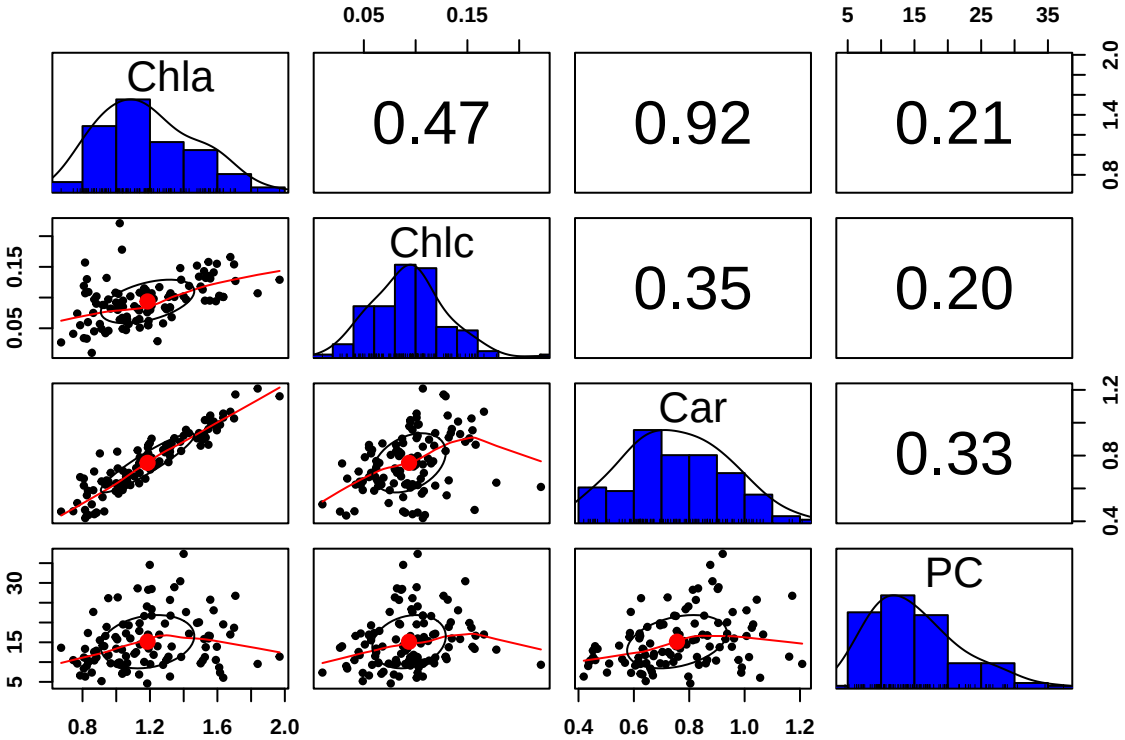
## 5. Graficas de correlación de variables continuas (pearson)

```
pairs.panels(Datos_Proyecto[,4:12], method = "pearson", hist.col = "blue", density = TRUE, font=4)
```



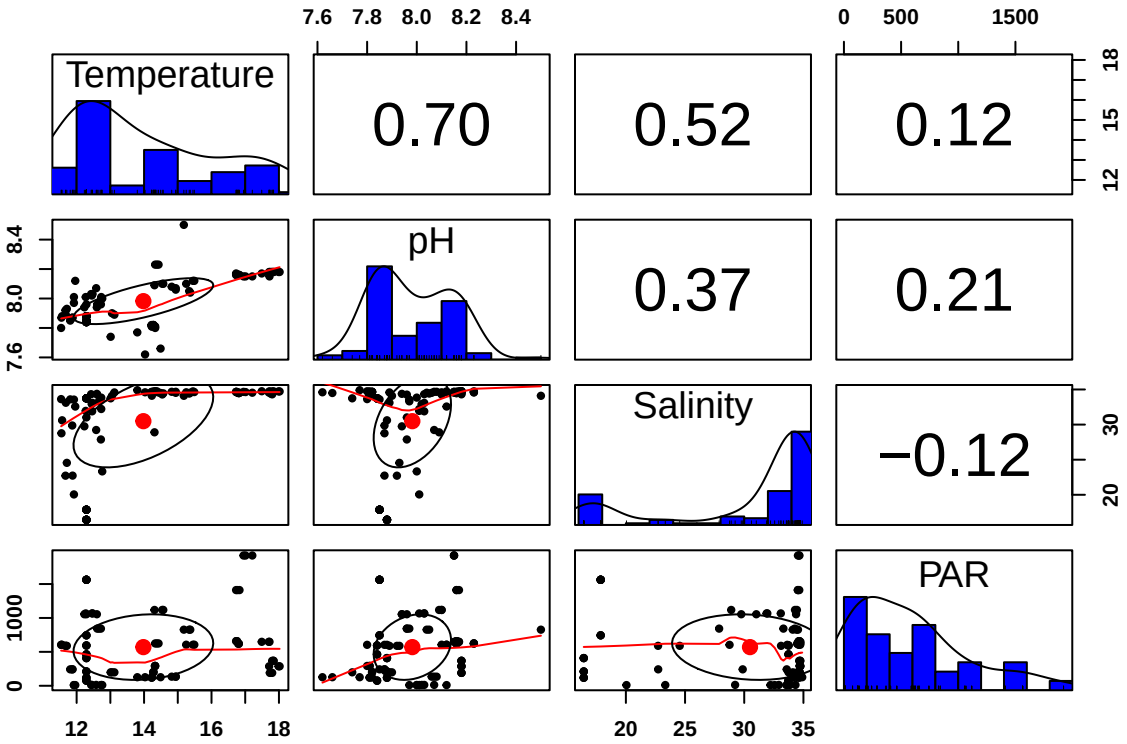

** Correlación entre las primeras 4 variables continuas

```
pairs.panels(Datos_Proyecto[,4:7], method = "pearson", hist.col = "blue", density = TRUE, font=2)
```



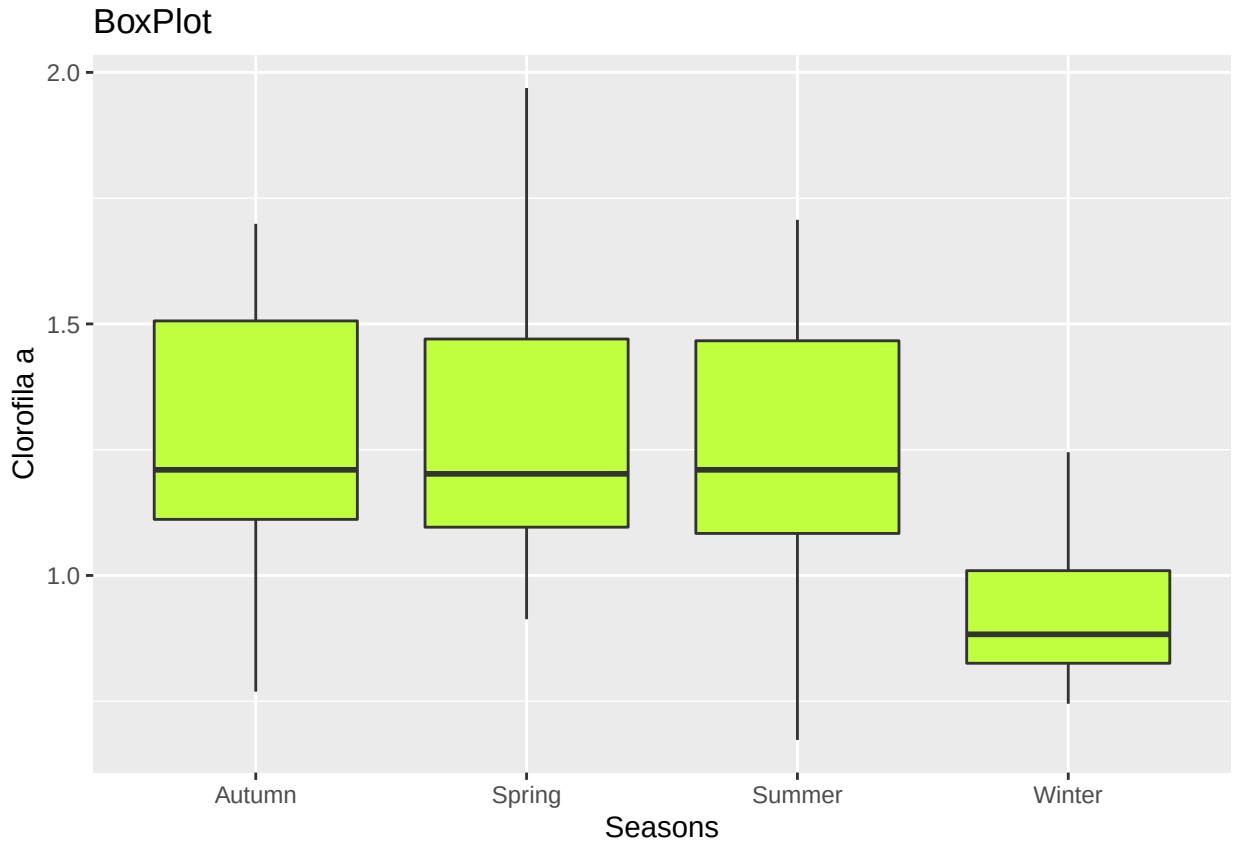

** Correlación entre las segundas 4 variables continuas

```
pairs.panels(Datos_Proyecto[,9:12], method = "pearson", hist.col = "blue", density = TRUE, font=2)
```

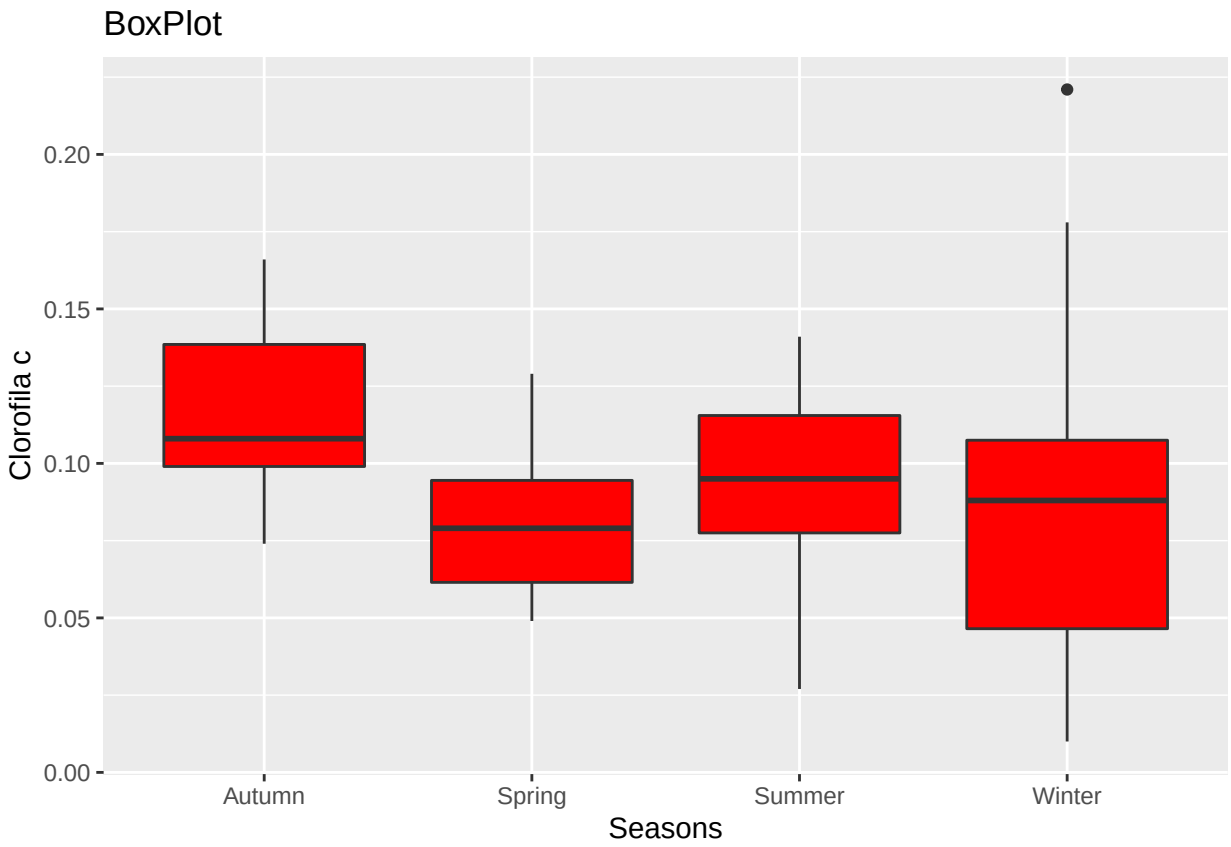



### 5. Relación entre variables continuas y factores (boxplot)

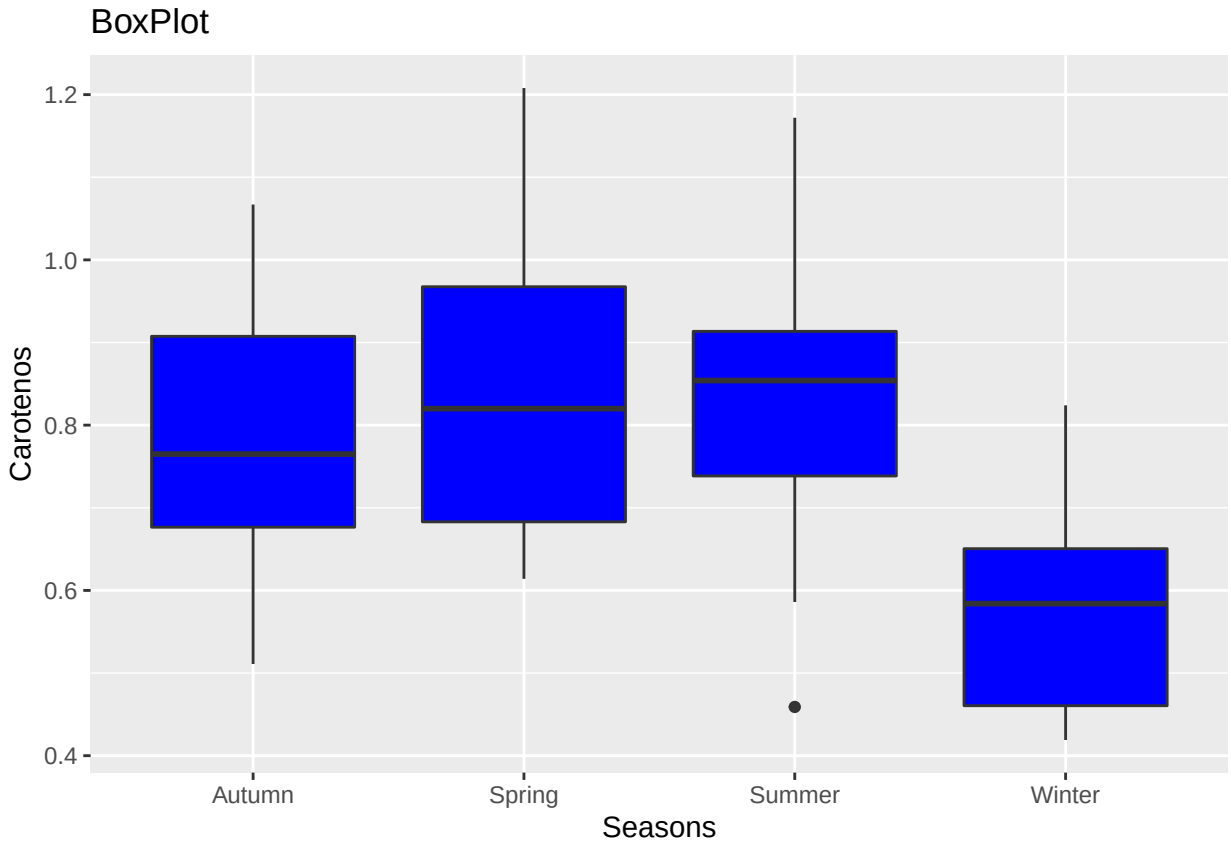
```
ggplot(Datos_Proyecto, aes(x= Seasons, y=Chla))+geom_boxplot(fill="olivedrab1")+labs(title = "BoxPlot",
```



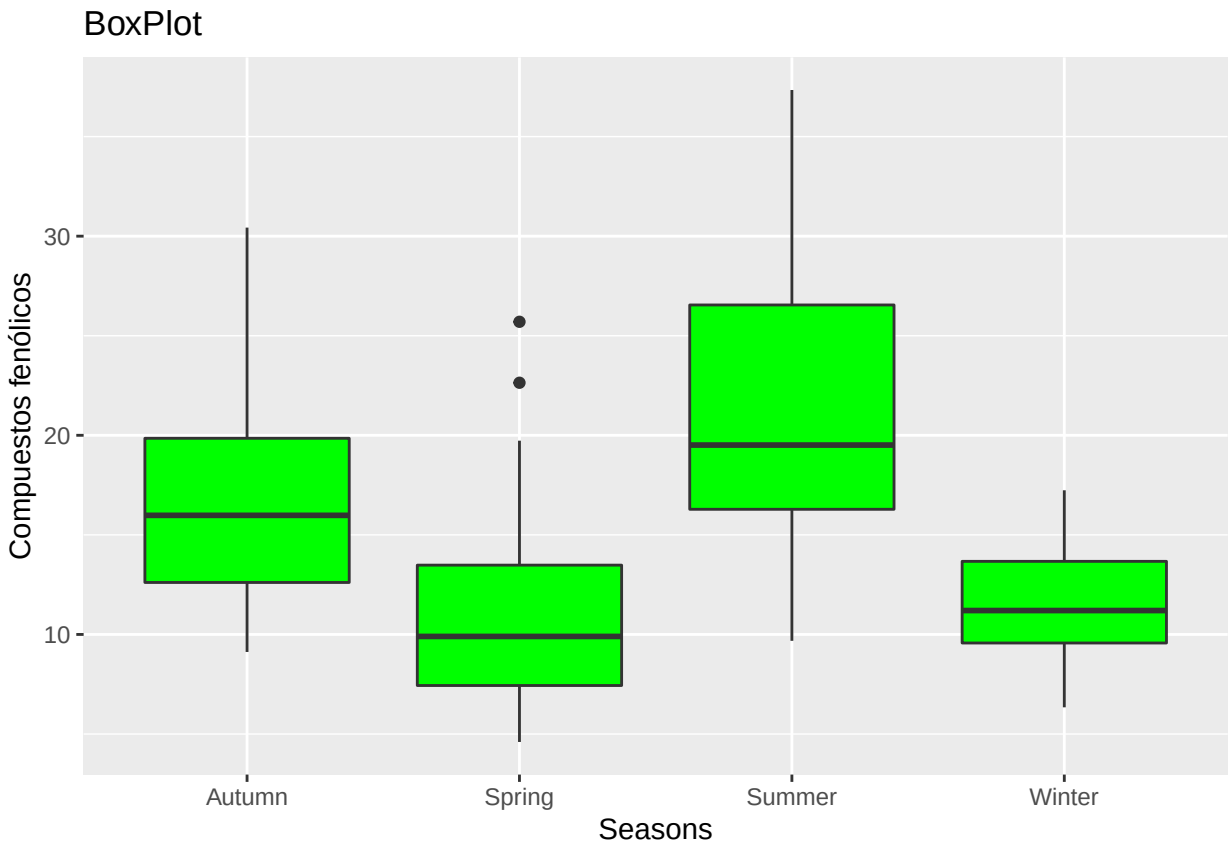
```
ggplot(Datos_Proyecto, aes(x= Seasons, y=Chlc))+geom_boxplot(fill="red")+labs(title = "BoxPlot", x= "Sea
```



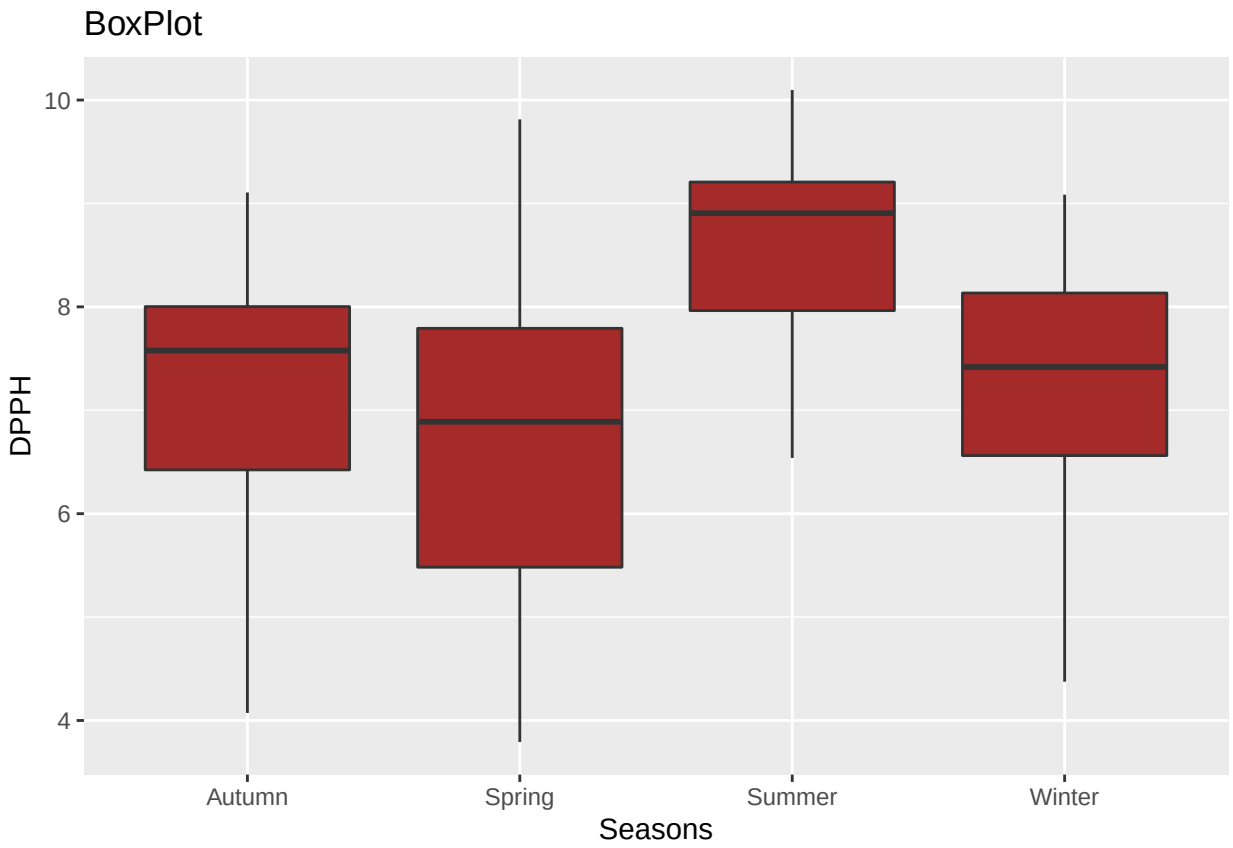

```
ggplot(Datos_Proyecto, aes(x= Seasons, y=Car))+geom_boxplot(fill="blue")+labs(title = "BoxPlot", x= "Sea
```



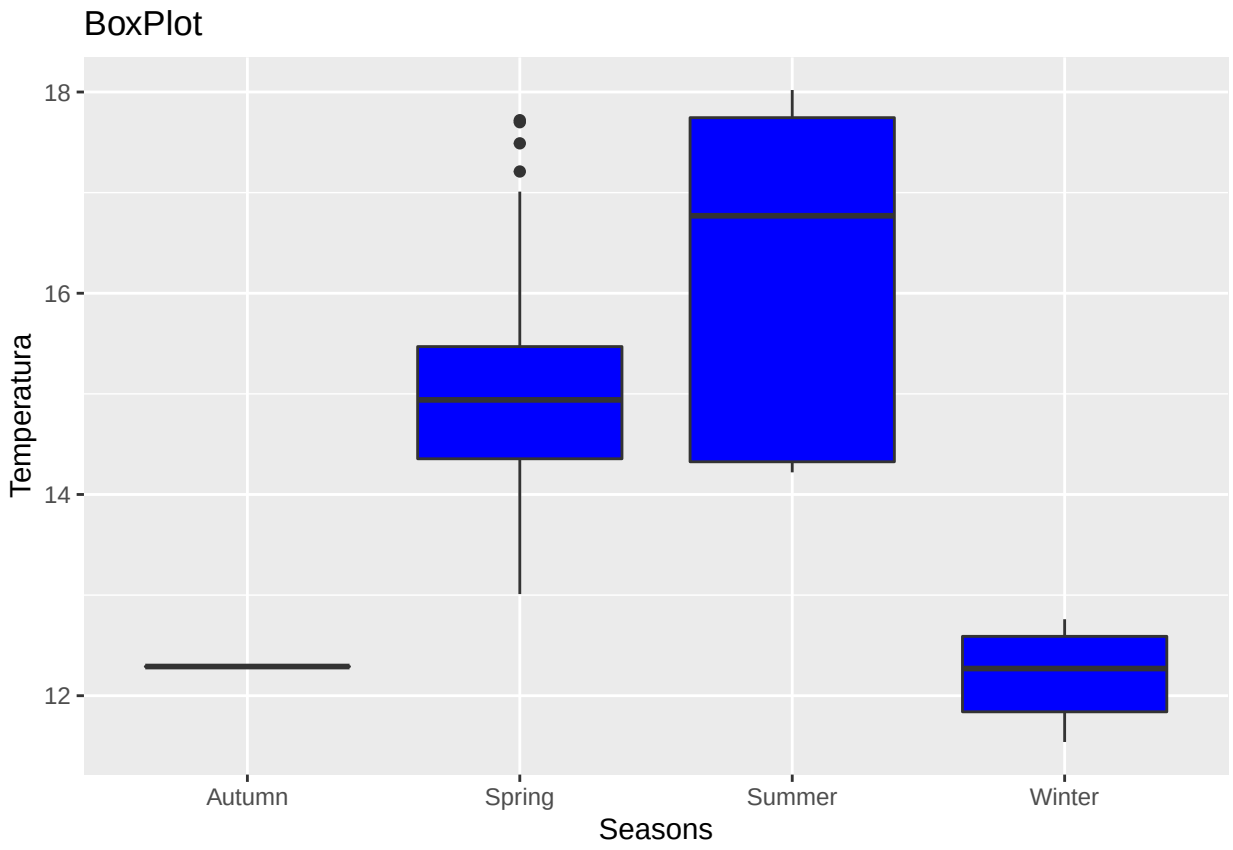

```
ggplot(Datos_Proyecto, aes(x= Seasons, y=PC))+geom_boxplot(fill="green")+labs(title = "BoxPlot", x= "Sea
```



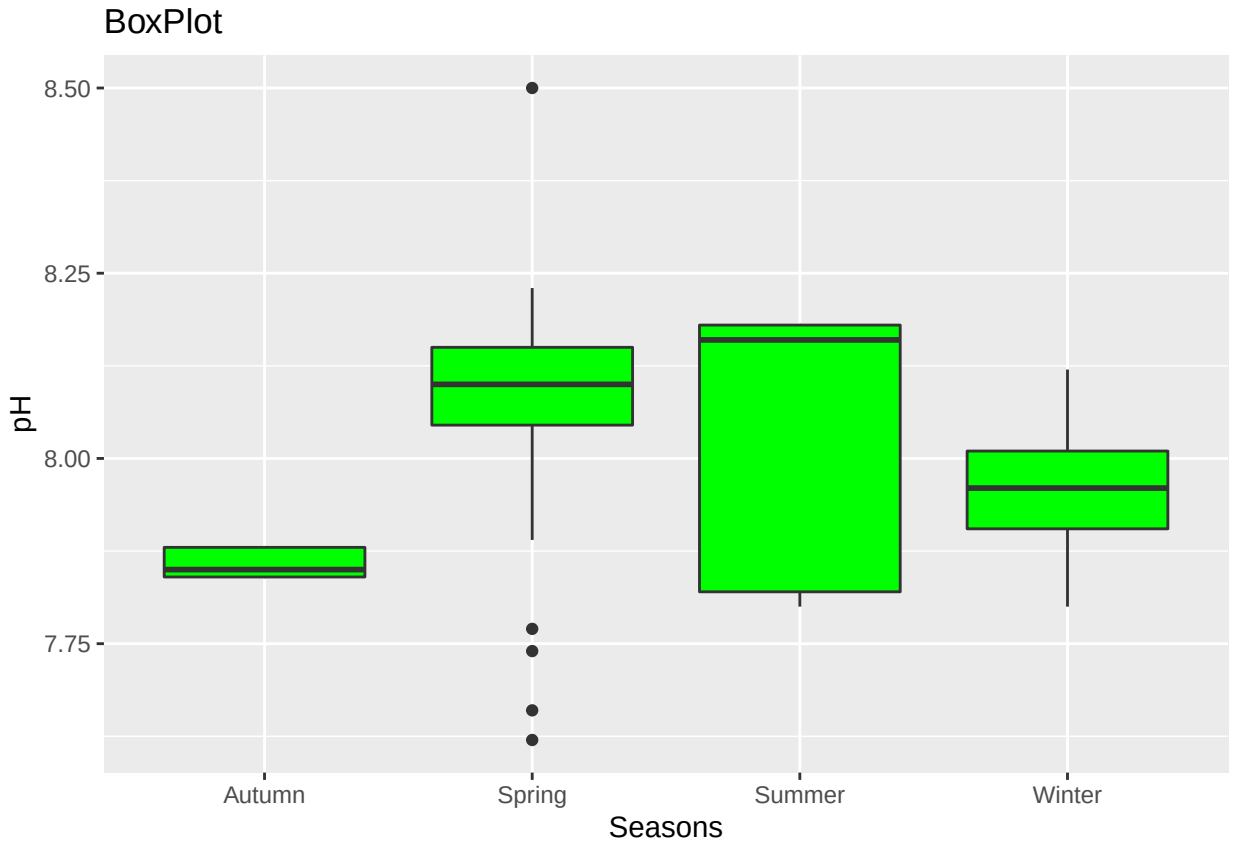

```
ggplot(Datos_Proyecto, aes(x= Seasons, y=DPPH))+geom_boxplot(fill="brown")+labs(title = "BoxPlot", x= "S
```



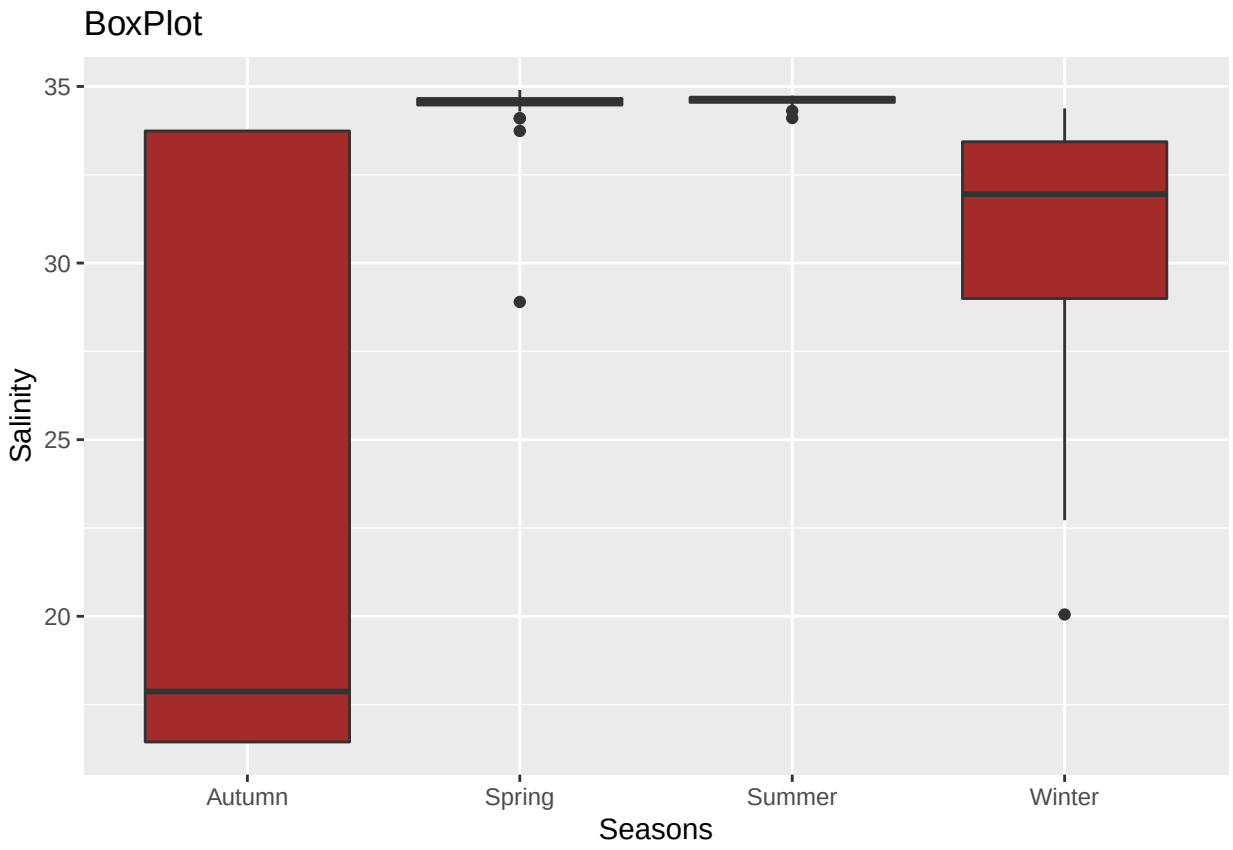

```
ggplot(Datos_Proyecto, aes(x= Seasons, y=Temperature))+geom_boxplot(fill="blue")+labs(title = "BoxPlot"
```



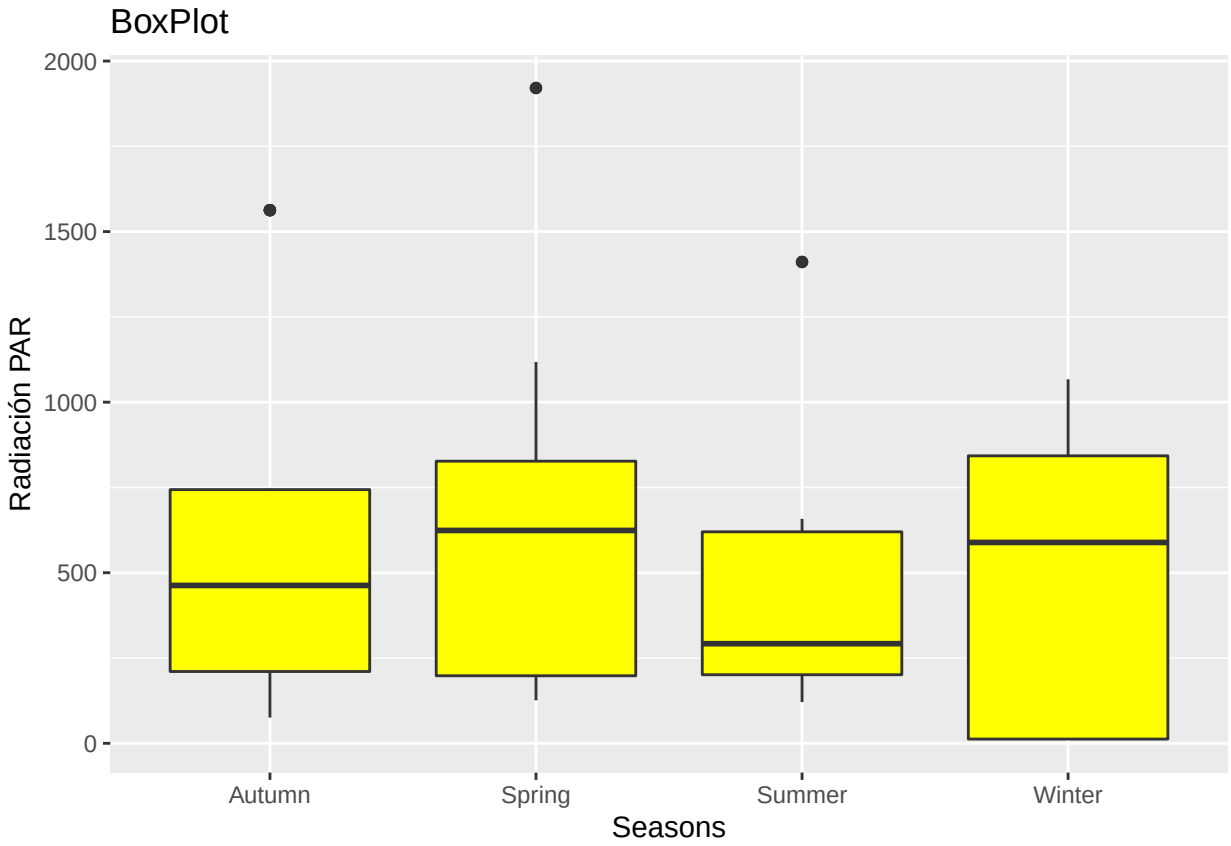

```
ggplot(Datos_Proyecto, aes(x= Seasons, y=pH))+geom_boxplot(fill="green")+labs(title = "BoxPlot", x= "Sea
```




```
ggplot(Datos_Proyecto, aes(x= Seasons, y=Salinity))+geom_boxplot(fill="brown")+labs(title = "BoxPlot", x
```




```
ggplot(Datos_Proyecto, aes(x= Seasons, y=PAR))+geom_boxplot(fill="yellow")+labs(title = "BoxPlot", x= "S
```




## 6. Identificación de outliers o error atípico

Variable Chlc : para la estación winter se registra un outlier Variable Car : para la estación summer se registra un outlier Variable PC : se registran 2 valores en Spring Variable Temperature: 3 valores en spring Variable pH : 5 valores en spring Variable Salinity: 3 valores en spring, 2 en summer y 1 en winter Variable PAR: 1 en autumn, 1 en spring y 1 en summer

## 7. Resumen de los datos con tablas y estadística descriptiva

### Habilita librerias

```
library(readxl)
library(tidyr)
library(dplyr)
```

```
##
## 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)
```

```r
Datos_Proyecto$Seasons <- as.factor(Datos_Proyecto$Seasons)
Datos_Proyecto$time <- as.factor(Datos_Proyecto$time)
Datos_Proyecto$Replicate <- as.factor(Datos_Proyecto$Replicate)
summary(Datos_Proyecto)
```

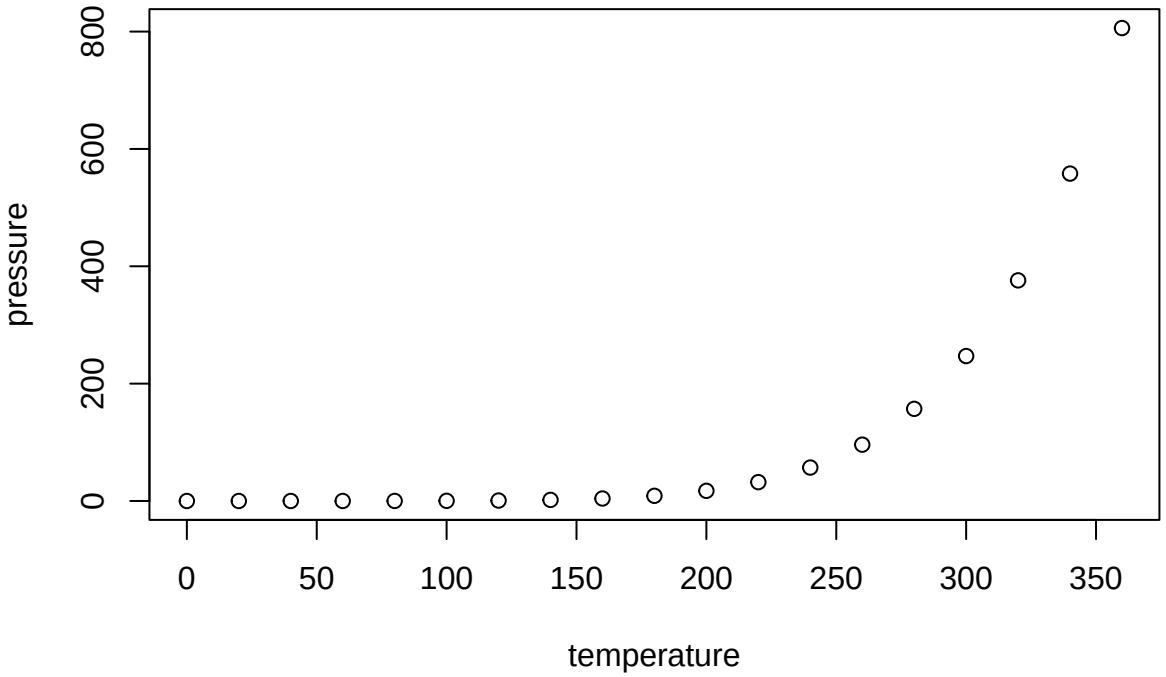
```
##    Seasons      time      Replicate       Chla            Chlc
##  Autumn:27   day 1:36   R1     :12   Min.   :0.6730   Min.   :0.01000
##  Spring:27   day 2:36   R2     :12   1st Qu.:0.9888   1st Qu.:0.06775
##  Summer:27   day 3:36   R3     :12   Median :1.1660   Median :0.09500
##  Winter:27              R4     :12   Mean   :1.1856   Mean   :0.09365
##                         R5     :12   3rd Qu.:1.3813   3rd Qu.:0.10975
##                         R6     :12   Max.   :1.9690   Max.   :0.22100
##                         (Other):36
##       Car               PC              DPPH         Temperature
##  Min.   :0.4190   Min.   : 4.600   Min.   : 3.792   Min.   :11.54
##  1st Qu.:0.6240   1st Qu.: 9.953   1st Qu.: 6.539   1st Qu.:12.29
##  Median :0.7520   Median :13.815   Median : 7.769   Median :12.88
##  Mean   :0.7557   Mean   :15.153   Mean   : 7.444   Mean   :13.98
##  3rd Qu.:0.8780   3rd Qu.:18.990   3rd Qu.: 8.433   3rd Qu.:15.35
##  Max.   :1.2080   Max.   :37.340   Max.   :10.097   Max.   :18.02
##
##        pH           Salinity          PAR
##  Min.   :7.620   Min.   :16.44   Min.   :   9.768
##  1st Qu.:7.850   1st Qu.:29.62   1st Qu.: 196.000
##  Median :7.960   Median :34.10   Median : 525.793
##  Mean   :7.982   Mean   :30.49   Mean   : 569.983
##  3rd Qu.:8.150   3rd Qu.:34.63   3rd Qu.: 764.500
##  Max.   :8.500   Max.   :34.90   Max.   :1921.000
##
```

```r
messy <- read_excel("Datos_Proyecto.xlsx")
summary(messy)
```

```
##    Seasons              time            Replicate              Chla
##  Length:108         Length:108         Length:108         Min.   :0.6730
##  Class :character   Class :character   Class :character   1st Qu.:0.9888
##  Mode  :character   Mode  :character   Mode  :character   Median :1.1660
##                                                           Mean   :1.1856
##                                                           3rd Qu.:1.3813
##                                                           Max.   :1.9690
##       Chlc              Car               PC              DPPH
##  Min.   :0.01000   Min.   :0.4190   Min.   : 4.600   Min.   : 3.792
##  1st Qu.:0.06775   1st Qu.:0.6240   1st Qu.: 9.953   1st Qu.: 6.539
##  Median :0.09500   Median :0.7520   Median :13.815   Median : 7.769
##  Mean   :0.09365   Mean   :0.7557   Mean   :15.153   Mean   : 7.444
##  3rd Qu.:0.10975   3rd Qu.:0.8780   3rd Qu.:18.990   3rd Qu.: 8.433
##  Max.   :0.22100   Max.   :1.2080   Max.   :37.340   Max.   :10.097
##   Temperature          pH           Salinity          PAR
##  Min.   :11.54   Min.   :7.620   Min.   :16.44   Min.   :   9.768
##  1st Qu.:12.29   1st Qu.:7.850   1st Qu.:29.62   1st Qu.: 196.000
##  Median :12.88   Median :7.960   Median :34.10   Median : 525.793
##  Mean   :13.98   Mean   :7.982   Mean   :30.49   Mean   : 569.983
##  3rd Qu.:15.35   3rd Qu.:8.150   3rd Qu.:34.63   3rd Qu.: 764.500
##  Max.   :18.02   Max.   :8.500   Max.   :34.90   Max.   :1921.000
```

```
Datos_tab <- Datos_Proyecto %>% group_by(Seasons) %>% summarize(n = n(),
Promedio_Chla = mean(Chla), Maximo_Chla = max(Chla), Promedio_Chlc = mean(Chlc), Maximo_Chlc = max(Chlc)
```

“‘ You can also embed plots, for example:




Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.