Wieloryby

Maria Pyznar

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Wprowadzenie

Celem projektu jest zrozumienie rozkładu geograficznego, sezonowości oraz różnorodności gatunków wielorybów obserwowanych na różnych platformach.

```r
dane <- read.csv("C:/Users/Mary/Downloads/All species data.csv", header = TRUE, stringsAsFactors = FALS
```

```r
head(dane)
```

```
##         Species Platform Year Month Day  Latitude Longitude Season
## 1 Bryde's whale      MRI 1963     2  19 -33.86667  17.43333 Summer
## 2 Bryde's whale      MRI 1963     2  22 -33.23333  16.36667 Summer
## 3 Bryde's whale      MRI 1973     2  11 -34.36667  25.73333 Summer
## 4 Bryde's whale      MRI 1973     2  12 -34.53333  25.83333 Summer
## 5 Bryde's whale      MRI 1975     1  20 -34.28333  26.01667 Summer
## 6 Bryde's whale      MRI 1975     1  20 -34.13333  25.80000 Summer
```

```r
summary(dane)
```

```
##    Species            Platform              Year           Month
##  Length:6018        Length:6018        Min.   :1913    Min.   : 1.000
##  Class :character   Class :character   1st Qu.:1913    1st Qu.: 3.000
##  Mode  :character   Mode  :character   Median :1972    Median : 9.000
##                                        Mean   :1956    Mean   : 7.182
##                                        3rd Qu.:1997    3rd Qu.:10.000
##                                        Max.   :2016    Max.   :12.000
##       Day            Latitude         Longitude          Season
##  Min.   : 0.000   Min.   :-38.34   Min.   :-0.1576   Length:6018
##  1st Qu.: 1.000   1st Qu.:-34.49   1st Qu.:18.2833   Class :character
##  Median : 1.000   Median :-33.08   Median :22.0672   Mode  :character
##  Mean   : 6.771   Mean   :-30.83   Mean   :28.8097
##  3rd Qu.:10.000   3rd Qu.:-29.28   3rd Qu.:34.5722
##  Max.   :31.000   Max.   :-10.13   Max.   :73.0865
```

```r
str(dane)
```

```
## 'data.frame':    6018 obs. of  8 variables:
##  $ Species  : chr  "Bryde's whale" "Bryde's whale" "Bryde's whale" "Bryde's whale" ...
```

```
##  $ Platform : chr  "MRI" "MRI" "MRI" "MRI" ...
##  $ Year     : int  1963 1963 1973 1973 1975 1975 1975 1975 1975 1983 ...
##  $ Month    : int  2 2 2 2 1 1 1 1 1 1 ...
##  $ Day      : int  19 22 11 12 20 20 21 21 28 23 ...
##  $ Latitude : num  -33.9 -33.2 -34.4 -34.5 -34.3 ...
##  $ Longitude: num  17.4 16.4 25.7 25.8 26 ...
##  $ Season   : chr  "Summer" "Summer" "Summer" "Summer" ...
```

```
lapply(dane, unique)
```

```
## $Species
## [1] "Bryde's whale"        "Humpback whale"       "Southern right whale"
## [4] "Sperm whale"
##
## $Platform
## [1] "MRI"                 "Incidental sighting" "MMO"
## [4] "OBIS"
##
## $Year
##  [1] 1963 1973 1975 1983 1984 1977 1985 1986 1987 1988 1998 1989 1990 1991 1992
## [16] 1993 1994 1995 1996 1997 1999 2001 2002 2003 2004 2007 2012 2013 2014 1976
## [31] 1982 2000 2008 2009 1913 2006 1972 1974 1965 1966 2011 2016 1979 1971 2015
## [46] 1978 1980 1981 1968 2010 1969
##
## $Month
##  [1]  2  1  3 11 10 12  4  5  6  8  9  7
##
## $Day
##  [1] 19 22 11 12 20 21 28 23 25 26 27 29 30 31  5  7  8 10 13  0  3  6 14 17 24
## [26]  4  2 16 18 15  1  9
##
## $Latitude
##    [1] -33.86667 -33.23333 -34.36667 -34.53333 -34.28333 -34.13333 -34.60000
##    [8] -34.80000 -34.61667 -34.58333 -34.56667 -33.81667 -33.78333 -33.76667
##   [15] -34.11667 -34.10000 -34.08333 -34.06667 -34.00000 -34.26667 -34.23333
##   [22] -34.16667 -34.15000 -34.41667 -34.05000 -35.01667 -34.90000 -34.88333
##   [29] -34.71667 -34.68333 -34.35000 -34.21667 -34.70000 -34.50000 -34.45000
##   [36] -34.43333 -34.20000 -34.98333 -34.63333 -32.16667 -30.85000 -32.01667
##   [43] -31.93333 -31.91667 -31.83333 -31.76667 -34.46667 -35.03333 -34.96667
##   [50] -34.78333 -34.76667 -34.75000 -34.48333 -35.08333 -32.40000 -33.91667
##   [57] -33.75000 -33.08333 -32.91667 -33.80000 -33.71667 -32.41667 -35.00000
##   [64] -34.83333 -34.03333 -34.55000 -19.36667 -33.83333 -33.88333 -34.93333
##   [71] -32.66667 -33.50000 -33.90000 -33.58333 -35.18333 -34.18333 -26.25000
##   [78] -34.66667 -35.16667 -29.90000 -26.90000 -34.33333 -28.70000 -34.25000
##   [85] -34.95000 -34.30000 -35.26667 -33.00000 -29.88333 -34.31667 -23.20000
##   [92] -35.21667 -33.41667 -33.33333 -28.63333 -28.50000 -34.16750 -33.93333
##   [99] -36.58333 -31.56889 -31.66667 -31.66861 -31.33333 -33.18417 -33.14833
##  [106] -34.16972 -34.65000 -35.12167 -35.09806 -35.06139 -35.12278 -34.01667
##  [113] -34.37222 -33.97472 -34.74639 -34.10734 -33.86670 -34.76670 -34.91667
##  [120] -32.58333 -33.98333 -31.50000 -31.53333 -33.96667 -32.45000 -29.86667
##  [127] -21.83333 -10.13333 -35.13333 -34.81667 -34.86667 -33.95000 -33.63333
##  [134] -32.20000 -32.63333 -35.20000 -32.88333 -26.93333 -27.38333 -27.10000
##  [141] -28.80000 -33.61667 -31.48333 -31.36667 -30.91667 -33.98556 -28.76667
##  [148] -36.76667 -34.08472 -34.16889 -35.25944 -34.18861 -33.03330 -32.70000
```

```
##   [155] -34.41667 -29.75000 -30.30000 -33.61667 -33.18333 -30.58333 -29.68333
##   [162] -34.26667 -33.98333 -20.66667 -33.05000 -30.25000 -31.96750 -32.20139
##   [169] -32.54222 -32.21611 -33.15167 -33.72750 -34.48333 -34.53333 -34.73444
##   [176] -34.96667 -33.00056 -29.85000 -34.11778 -29.26722 -29.43361 -29.42917
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##   [197] -17.71242 -21.22836 -23.69035 -24.10278 -22.07917 -22.81782 -22.97092
##   [204] -23.11647 -23.38561 -20.98956 -23.71209 -23.60335 -17.82339 -21.52808
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##   [253] -30.50000 -29.36667 -32.41667 -33.25000 -34.11667 -33.91667 -34.36667
##   [260] -34.08333 -34.01667 -31.51667 -30.93556 -34.95139 -29.19167 -29.20000
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## [813] -34.47597 -34.47592 -34.47547 -34.47530 -34.47503 -34.47499 -34.47478
## [820] -34.47476 -34.47440 -34.47439 -34.47416 -34.47376 -34.47370 -34.47355
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```

```
##  [911] -34.45415 -34.45414 -34.45388 -34.45385 -34.45382 -34.45372 -34.45372
##  [918] -34.45369 -34.45347 -34.45340 -34.45340 -34.45339 -34.45336 -34.45335
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##  [932] -34.45269 -34.45258 -34.45255 -34.45247 -34.45245 -34.45245 -34.45232
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## [3095]  0.319540  4.827730  3.455960  4.213580  3.271010  4.644090  4.166630
## [3102]  4.368630  4.598600  4.101800  3.836070  2.636250 70.335100 65.545030
## [3109] 69.915970 64.845700 56.905110 51.243680 50.904070 50.564470 53.749570
## [3116] 53.820860 52.574270 52.166750 51.735370 51.052340 51.268030 51.663470
## [3123] 51.450780 50.985060 59.402750 53.596680 52.508270 52.116960 52.482450
## [3130] 52.189730 51.839710 51.753340 51.794120 51.550260 51.339790  8.445450
## [3137]  8.353630  7.802940  7.393080  8.301970  7.590290  7.932450  6.925230
## [3144]  5.507200  8.177930  7.084450  7.921300  7.642350  7.293720 60.495510
## [3151] 60.342040 62.950870 60.989990 59.932820 58.099820 60.768470 57.581470
## [3158] 61.467420 64.900980 63.632910 60.751270 63.019070 64.229700 60.393200
## [3165] 60.955890 52.344690 52.785570  2.243010 65.473180 56.805860 59.468600
## [3172] 53.215480 63.489910 53.999630 55.849430 53.537180 57.015610 61.023600
## [3179] 56.472730 54.220800 52.933980 53.758350 64.455820 51.562470 56.855480
## [3186] 55.945750 52.108310 54.076650 57.450950 50.851220 53.679670 57.103590
## [3193] 57.384780 55.416440 57.715600 63.302410 65.688210 64.195570 52.679760
## [3200] 55.307410 57.247290 58.517020 57.935060 55.607210 52.379960 53.191180
## [3207] 52.771910 56.593370 56.090710 34.575190 65.704560 64.584360 65.153640
## [3214]  7.159970 53.070100 56.687820 64.841450 65.631110  9.804390  9.988030
## [3221] 49.929840 51.196960 50.522330 49.048370 14.799410 65.759660 65.098550
## [3228] 62.803040 63.941620  3.393860  0.824100 31.958830 33.487060 56.293390
## [3235]  8.403020  3.418700  5.505250  0.086670 55.002680 54.009060 51.583290
## [3242]  1.348070  0.610640  3.356600  7.119840 50.588720 50.346150 49.666930
## [3249] 15.105860  5.716390 57.259580 55.925410 50.879540 51.281270 51.033160
## [3256] 49.691190 49.739710  6.313330 49.301880 49.848060 49.825990 49.488570
## [3263]  2.682970 50.405260 27.235070  5.892410  8.334140 53.584700 28.076890
## [3270] 25.650470  1.717170 57.542080 64.166110 50.594090 63.543280 63.001700
## [3277] 64.473010 53.645190 63.885270 55.100650 54.761040 56.778730 63.110020
## [3284] 63.768950 50.152090  6.511270 52.723400 55.027880 54.372920 53.580360
## [3291]  6.685150 53.063010 51.195170 53.523900 51.316450 50.443180 50.394660
## [3298] 53.160040 63.190560 18.831840 19.167180 53.984800 63.362760 63.555970
## [3305] 58.164320 34.178210 63.951740 57.730110 52.592170 58.672740 60.597810
## [3312] 60.942560 49.048280 61.331010 61.740240 56.929660  7.631190 50.468160
## [3319] 12.726030 47.978720 47.177170 11.236790 17.150010 50.627680 33.913560
## [3326] 65.341860 54.469950 53.742220 28.695880 53.852070 49.884010 10.022610
## [3333] 39.818320 50.055050  9.516890 64.310910  7.529700  6.388680 66.053480
## [3340] 56.276560 60.035120 63.547660 56.094610 33.125833 32.455278 22.082500
## [3347] 20.346111 22.321389 21.340278 21.607222 21.710000 21.869167 21.868889
## [3354] 21.644167 21.450556 20.758056 20.733611 22.124722 22.067222 21.748056
## [3361] 20.676111 20.254722 21.306111 21.541111 33.200000 32.833333 17.433333
## [3368] 15.533333 15.083333 31.483333 31.900000 33.133333 32.916667 32.483333
## [3375] 32.516667 32.633333 33.150000 30.850000 31.233333 31.550000 33.266667
## [3382] 32.683333 33.283333 30.250000 30.150000 31.450000 31.683333 31.533333
```

```
## [3389] 33.300000 31.516667 31.333333 32.783333 31.633333 32.050000 32.083333
## [3396] 31.083333 30.333333 30.933333 30.816667 30.950000 31.066667 30.983333
## [3403] 30.900000 32.800000 32.350000 33.183333 29.766667 31.400000 31.383333
## [3410] 33.666667 32.933333 33.516667 33.483333 33.366667 33.633333 33.333333
## [3417] 30.433333 31.283333 33.550000 34.000000 30.350000 31.350000 33.450000
## [3424] 31.866667 30.516667 32.016667 33.416667 30.683333 31.266667 31.300000
## [3431] 31.816667 31.133333 32.650000 32.883333 30.650000 30.966667 31.366667
## [3438] 33.116667 15.416667 15.583333 10.983333 10.966667  5.740020 58.153710
## [3445]  7.966200 42.595590 48.062680 39.993320 33.681650 41.201840 41.432030
## [3452] 42.180160 40.223520 41.547130 42.775420 37.269210 41.749690 41.711540
## [3459] 42.418740 42.957040  9.268480 40.692550 41.191200 41.668180 37.375420
## [3466] 43.308580 42.572540 37.570540 38.177600 42.297900 37.917430 37.136930
## [3473] 41.726650 48.153260 36.746680 48.603680 38.632890 46.648230 45.384880
## [3480] 44.527990 31.976950 37.364970 48.936320  8.904560 47.979890 36.518290
## [3487] 36.000870 34.746520 34.605410 33.931190 35.326660 35.624560 33.711680
## [3494] 34.260460 43.951290 37.051380 36.298770 37.882390 35.765680 36.957310
## [3501] 37.945110 35.797040 33.852800 33.382420 44.128170 34.103670 35.201220
## [3508] 35.671600 45.659340 34.464290 35.828390 33.115870  9.356990 38.808250
## [3515] 38.753820 42.335320 34.618480  8.675520  9.367980  9.928540 10.478110
## [3522] 35.420370 44.100950 45.774480 32.821640 34.644830 44.917310 35.393160
## [3529] 34.930560 45.243850 33.801270 34.563200 34.903350 35.216280 45.000810
## [3536] 35.540910 33.131550 33.445130 33.946870 48.168040 40.908500 40.510900
## [3543] 47.120230 44.732130 43.802560 43.305890 44.090950 43.546220 44.379350
## [3550] 34.167740 42.159030 40.191360 42.562650 42.932640 41.368600 41.805850
## [3557] 43.033540 41.856310 42.545830 47.322040 32.837910  9.784660 10.486350
## [3564] 35.461190 47.679310 42.758660  9.894630 40.887680 38.546170 39.304990
## [3571] 37.830710 45.758390 36.898440 58.101670 34.934670 62.976610 61.225200
## [3578] 38.114350 58.800220 55.849840 67.536960 69.668630 69.029130 68.292730
## [3585] 68.370250 67.750130 67.168770 66.664920 58.886380 55.679600 34.855250
## [3592] 39.738600 35.527700 37.194200 34.942960 40.475740 43.193740 42.373000
## [3599] 41.872090 11.772770 47.098640 46.055000 43.484350 42.935070 47.507040
## [3606] 39.868690 39.560080 32.671970 32.863250 32.753610 32.427070  8.844250
## [3613]  8.420900  7.456180  6.163080  8.961300  8.778920  8.075960  8.752460
## [3620]  8.264110  7.370390  7.793730  7.235640  6.947050  6.821610  6.413950
## [3627]  5.943570  4.015010  3.450550  8.311150  9.407440  9.472480  8.887100
## [3634] 62.983880 62.178200  8.671770  8.020880  8.334790  7.408940  7.881800
## [3641]  7.047340  7.466460  6.774000  6.268510  6.686070  5.795650  5.503590
## [3648]  5.128080  8.136940  7.172510  6.379770  5.879100  6.671830 58.682140
## [3655] 61.919230 62.998260 60.034520 61.372520 61.084780 63.070200 55.200470
## [3662] 59.459040 60.322270 60.998460 61.876070 59.905040 61.559550 61.228650
## [3669] 60.725100 59.732400 60.494910 61.573940 60.048910 63.530580 59.142530
## [3676] 60.451750 62.206970 61.760970 62.911940 61.401300 58.984270 60.595620
## [3683] 61.847300 62.465940 65.084390 62.264520 64.695940 62.422780 61.942830
## [3690] 61.968920 63.977800 39.586840 63.690820 64.186510 54.585640 62.964860
## [3697]  8.642340 57.977250 40.345660 54.898470  7.347780 54.404110 40.150540
## [3704] 38.979780 39.370030 40.193900 39.109870 58.461020 58.018750 60.658560
## [3711] 59.898400 52.877340 55.866590 55.474610 63.739340 63.566580 64.618690
## [3718] 61.203610 39.298060 54.781610 39.175610 54.550310 55.516330 53.665920
## [3725] 58.323860 58.606920 61.897460 64.144220 38.957910 26.032280 25.855410
## [3732] 54.876850 55.434690  3.726790  4.662370 57.116520 59.273460 61.800860
## [3739]  9.503990 62.789170 61.626450 61.471420 62.242280 64.000510 59.554220
## [3746] 63.436540 63.221210 63.487810 64.318380 56.146020 57.048360 63.292990
## [3753] 52.762230 53.992700 54.679710 54.249050 53.685080 62.619550 62.454490
## [3760] 56.501810 57.544950 57.004750 55.626310 62.313620 63.370530 62.718770
```

```
## [3767] 54.146510 56.371410 57.417500 39.679030 63.666560 62.481260 54.169340
## [3774] 63.761520 63.257230 63.113360 62.581040 62.509100 60.230110 63.214070
## [3781] 55.436760 42.125390 40.628620 36.471250 36.220380 37.521760 10.364230
## [3788] 40.755840 40.128850 43.594930 43.864720 43.928500 55.483610 13.383300
## [3795] 18.316700 33.028333 33.025278 32.914444 32.638333 32.672222 32.623611
## [3802] 32.616667 32.626389 32.752222 33.146667
##
## $Season
## [1] "Summer" "Winter"
```

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.2.3
```

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 4.2.3
```

```
##
## 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
```

Opis

Zestaw danych dostępny na figshare zawiera informacje o obserwacjach czterech gatunków wielorybów:
Bryde's whale (wieloryb Bryde'a), Humpback whale (wieloryb garbaty), Sperm whale (kaszalot) oraz South-
ern right whale (wieloryb południowy) w regionie Afryki Południowej. Dane obejmują koordynaty ge-
ograficzne, daty obserwacji oraz platformę, z której pochodzą dane, dla sezonów letnich i zimowych.

Struktura Danych

Dane zawierają informacje takie jak: - `Species`: Gatunek wieloryba. - `Platform`: Platforma obserwacyjna.
- `Year`: Rok obserwacji. - `Month`: Miesiąc obserwacji. - `Latitude` i `Longitude`: Współrzędne geograficzne
obserwacji. - `Season`: Sezon, w którym dokonano obserwacji.

#Czyszczenie

```
dane <- na.omit(dane)
for(i in 1:ncol(dane)){
  if(is.numeric(dane[,i])){
    dane[is.na(dane[,i]), i] <- median(dane[,i], na.rm = TRUE)
  }
}
dane <- unique(dane)
```
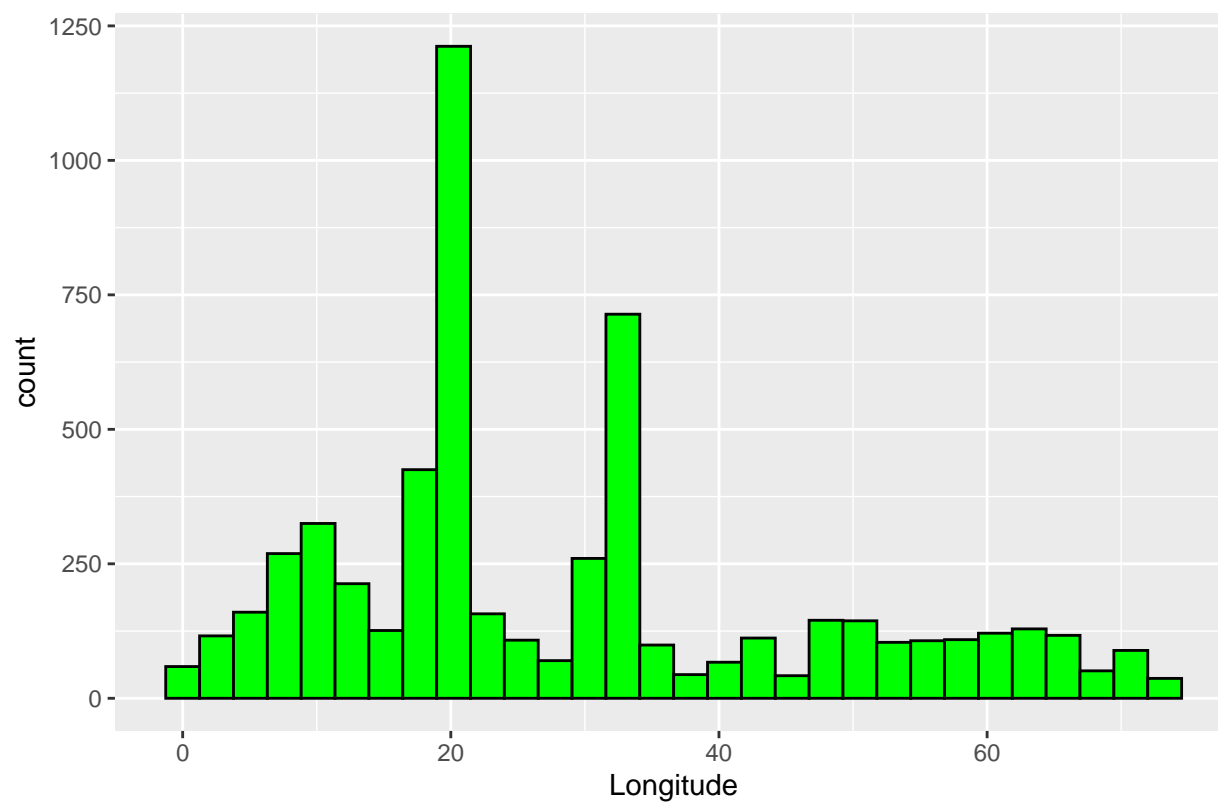
#Eksploracja

```
ggplot(dane, aes(x=Latitude)) + geom_histogram(bins=30, fill="blue", color="black") + ggtitle("Rozkład S
```

Rozklad Szerokosci Geograficznej
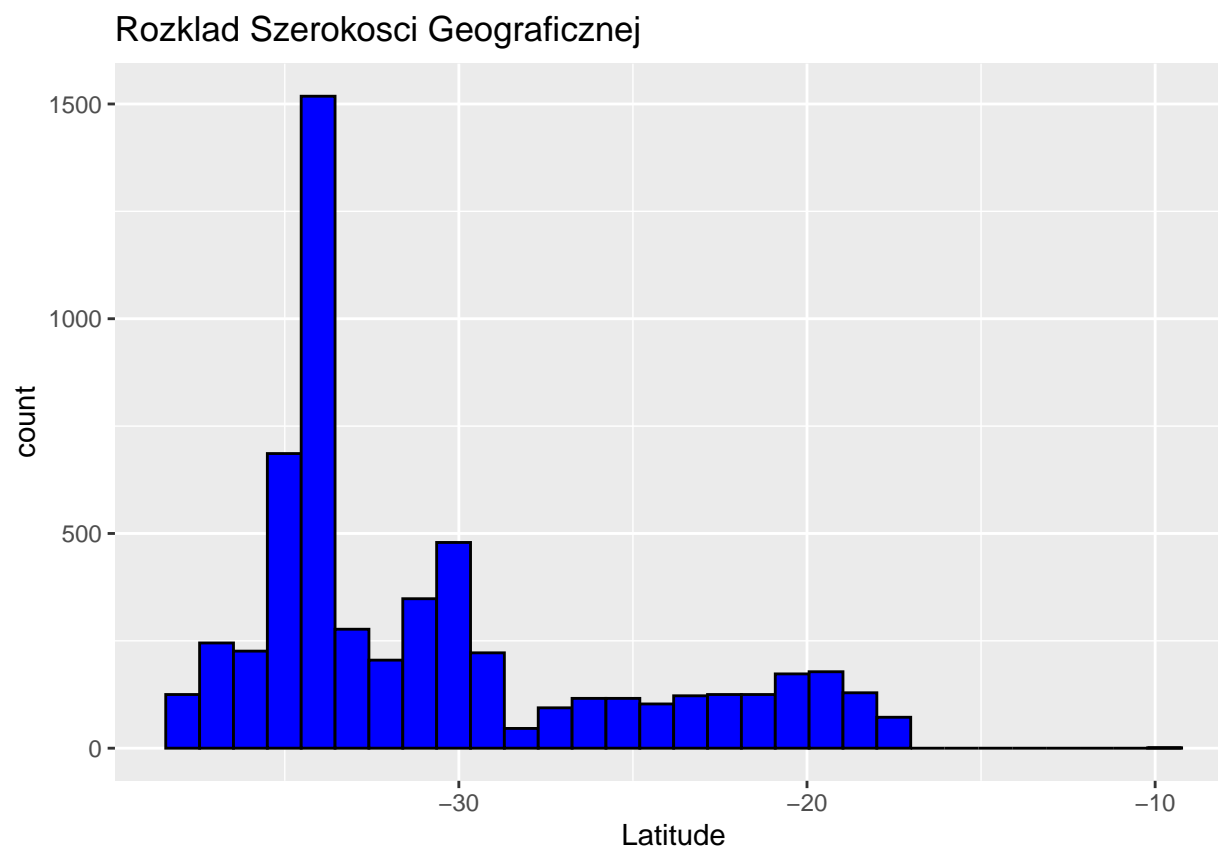

```
ggplot(dane, aes(x=Longitude)) + geom_histogram(bins=30, fill="green", color="black") + ggtitle("Rozkład
```
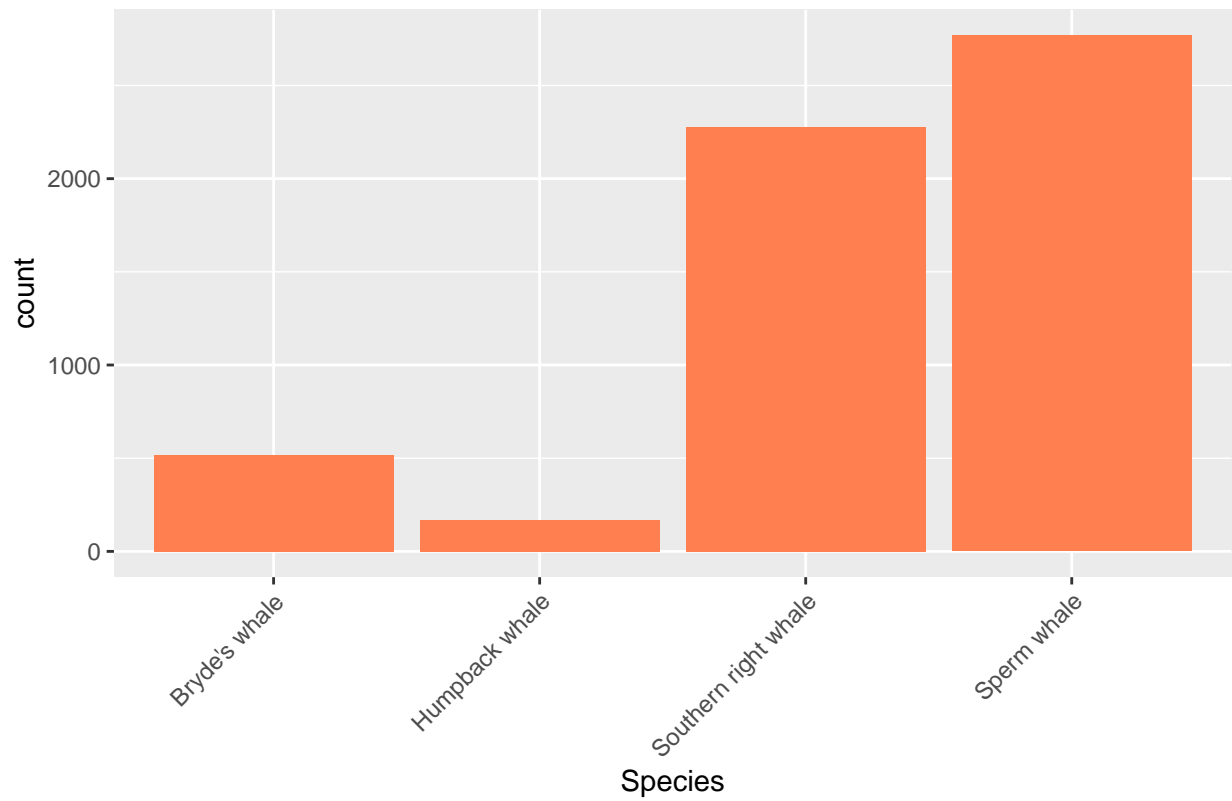
Rozklad Dlugosci Geograficznej


```
ggplot(dane, aes(x=Species)) + geom_bar(fill="coral") + theme(axis.text.x = element_text(angle = 45, hj
```
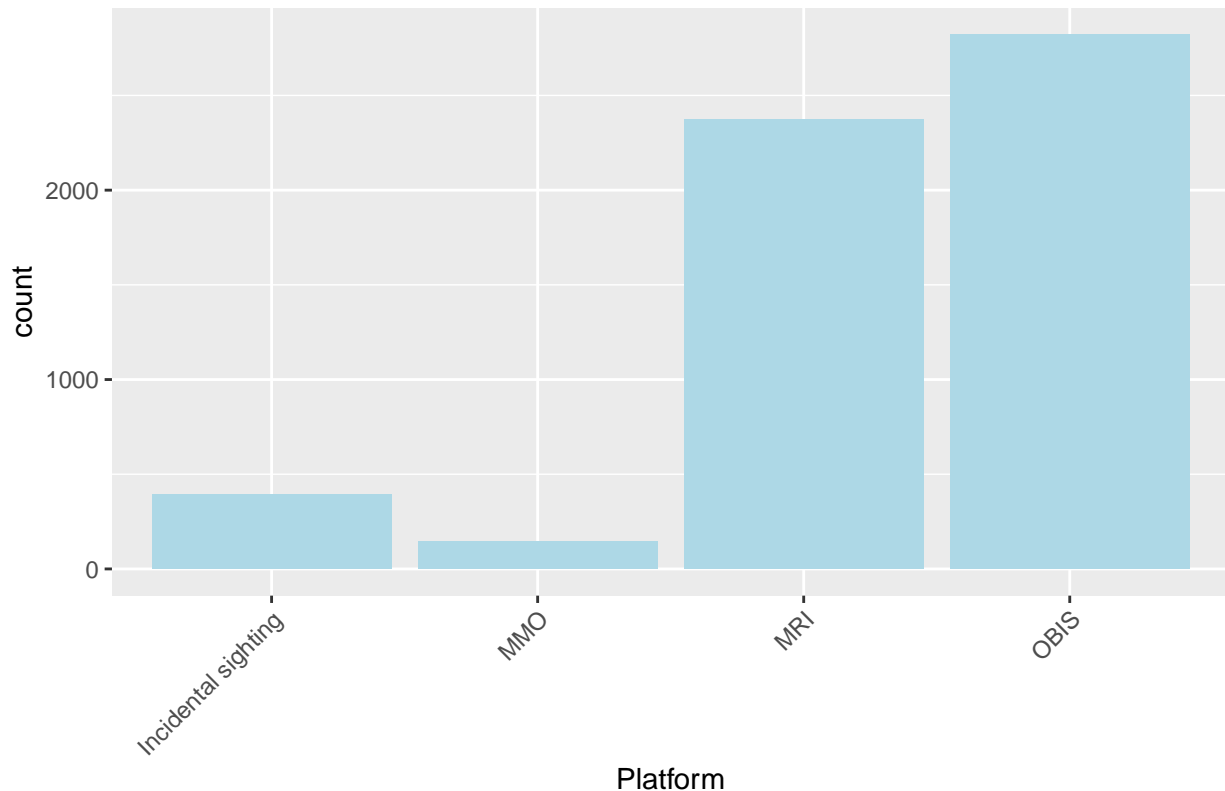
Rozklad Gatunków


```
ggplot(dane, aes(x=Platform)) + geom_bar(fill="lightblue") + theme(axis.text.x = element_text(angle = 45
```

Rozklad Platform

- Istnieje wyraźne skupienie obserwacji wielorybów w określonych szerokościach geograficznych. Największa liczba obserwacji została zanotowana w zakresie szerokości geograficznej około -34 stopni, co sugeruje, że ta lokalizacja może być popularnym obszarem dla wielorybów lub obszarem intensywnych badań. Dane obejmują szeroki zakres szerokości geograficznych, od około -38 do -20 stopni. - Obserwacje wielorybów występują na różnych długościach geograficznych, co wskazuje na szeroki zakres ich występowania lub aktywności badawczej. Widać wyraźne koncentracje obserwacji w określonych długościach, szczególnie w okolicach 20 i 40 stopni. - Wykres pokazuje, że w zestawie danych są dwa gatunki, które dominują pod względem liczby obserwacji: "Southern right whale" i "Sperm whale". - Większość danych pochodzi z dwóch platform: "MRI" i "OBIS". Oznacza to, że te platformy są głównymi źródłami informacji o obserwacjach wielorybów w badanym regionie.

#Analiza czasowa

```
dane$Year <- as.integer(as.character(dane$Year))
yearly_counts <- dane %>%
  filter(!is.na(Year)) %>%
  group_by(Year, Species) %>%
  summarise(count = n(), .groups = 'drop')
ggplot(yearly_counts, aes(x = Year, y = count, color = Species)) +
  geom_line() +
  labs(title = "Liczba obserwacji różnych gatunków wielorybów w ciągu lat",
       x = "Rok",
       y = "Liczba obserwacji") +
  theme_minimal()
```

## Liczba obserwacji róznych gatunków wielorybów w ciagu lat
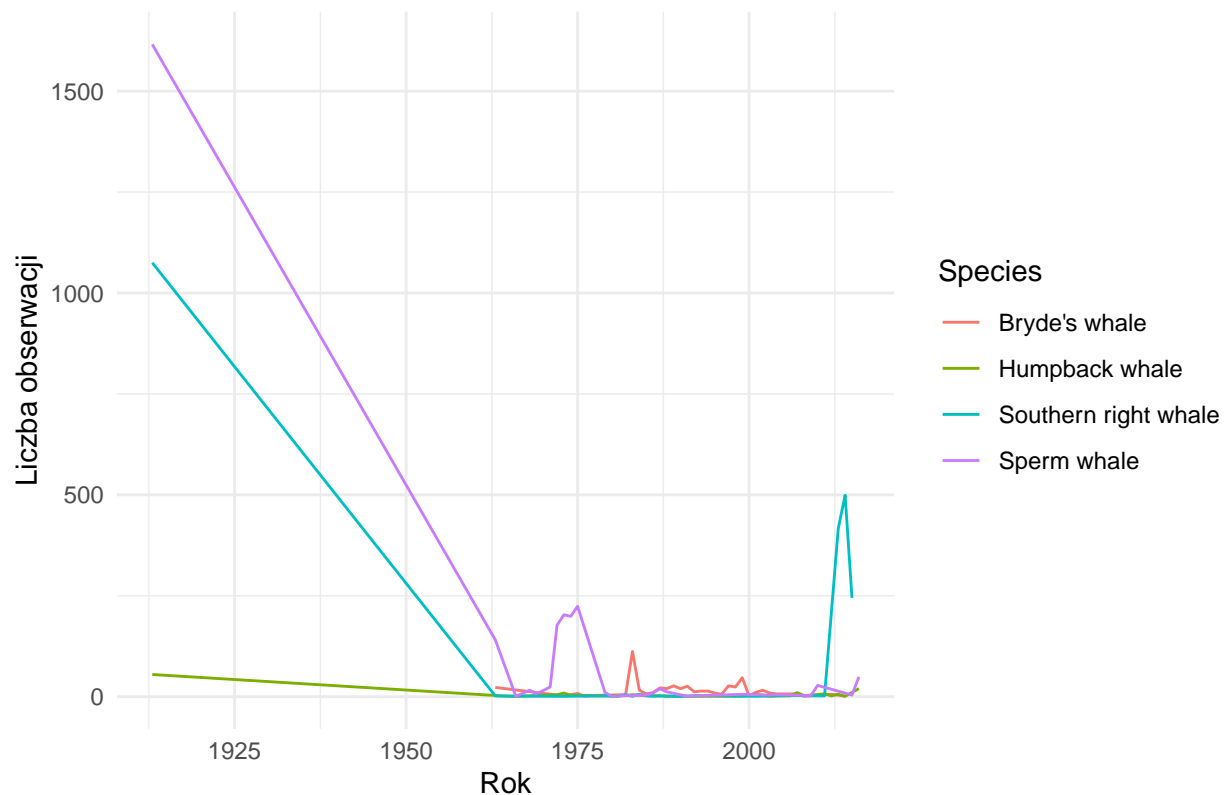
- Obserwacje wieloryba biskajskiego (Bryde's whale) wykazują spadek na początku dostępnych danych, a następnie utrzymują się na relatywnie niskim poziomie. -Obserwacje humbaka (Humpback whale) rozpoczynają się później w dostępnej chronologii i wykazują okresowe wzrosty. -Obserwacje płetwala karłowatego (Southern right whale) są najwyższe na początku i gwałtownie spadają, co może wskazywać na intensywną obserwację lub wysokie stężenie tych wielorybów w przeszłości. W późniejszym okresie obserwacje są sporadyczne. - Obserwacje kaszalota (Sperm whale) pojawiają się regularnie z kilkoma szczytami obserwacji w określonych latach.

#Gegraficzna

```
ggplot(dane, aes(x = Longitude, y = Latitude, color = Species)) +
  geom_point(alpha = 0.6) +
  labs(title = "Rozkład przestrzenny obserwacji wielorybów",
       x = "Długość geograficzna",
       y = "Szerokość geograficzna") +
  theme_minimal() +
  theme(legend.position = "bottom") +
  coord_quickmap()
```

Rozklad przestrzenny obserwacji wielorybów
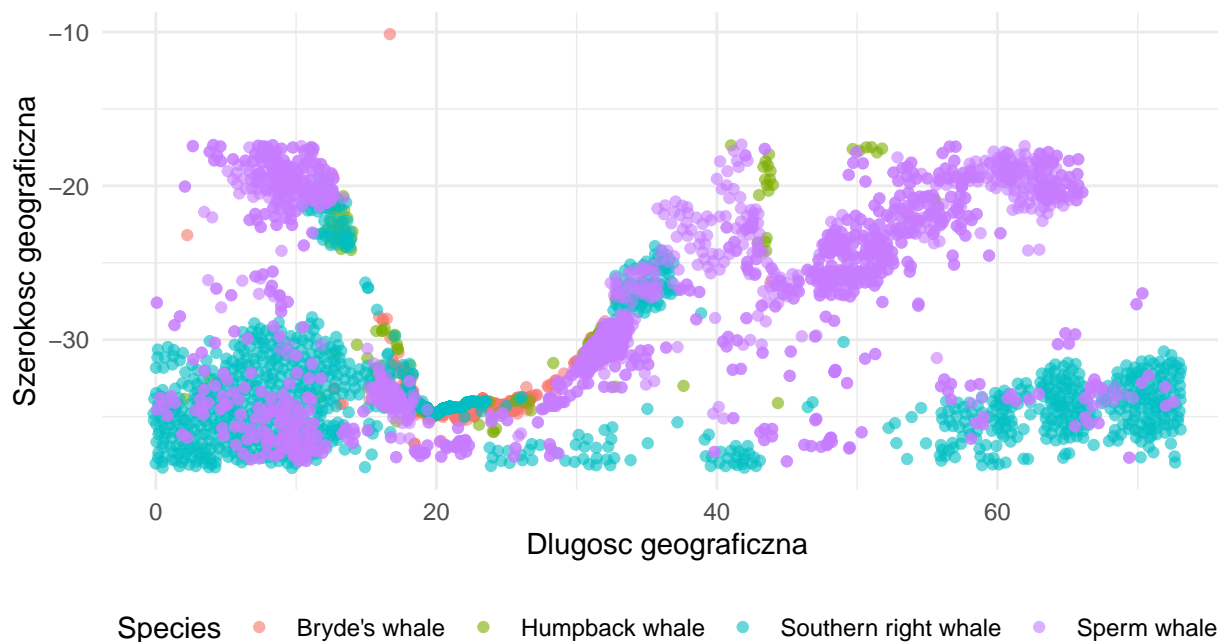
- Na podstawie przedstawionych histogramów i wykresów rozkładu możemy zauważyć, że obserwacje wielorybów są najbardziej skoncentrowane w określonych szerokościach geograficznych, co wskazuje na preferowane środowisko lub szlaki migracyjne tych gatunków. Rozkład długości geograficznej pokazuje również specyficzne obszary, gdzie wieloryby są najczęściej spotykane, co może odzwierciedlać kluczowe rejony żerowania lub rozmnażania.

#Gatunek a platforma obserwacyjna

```
tabela_gatunek_platforma <- table(dane$Species, dane$Platform)
print(tabela_gatunek_platforma)
```

```
##
##                         Incidental sighting  MMO  MRI OBIS
##   Bryde's whale                         373   22  118    6
##   Humpback whale                         14   61   30   62
##   Southern right whale                    5    8 1179 1085
##   Sperm whale                             0   53 1046 1669
```

```
df_gatunek_platforma <- as.data.frame(tabela_gatunek_platforma)
ggplot(df_gatunek_platforma, aes(Var1, Freq, fill = Var2)) +
  geom_bar(stat = "identity", position = position_dodge()) +
  labs(title = "Obserwacje gatunków na różnych platformach",
       x = "Gatunek",
       y = "Liczba obserwacji",
       fill = "Platforma") +
  theme_minimal() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```

Obserwacje gatunków na róznych platformach
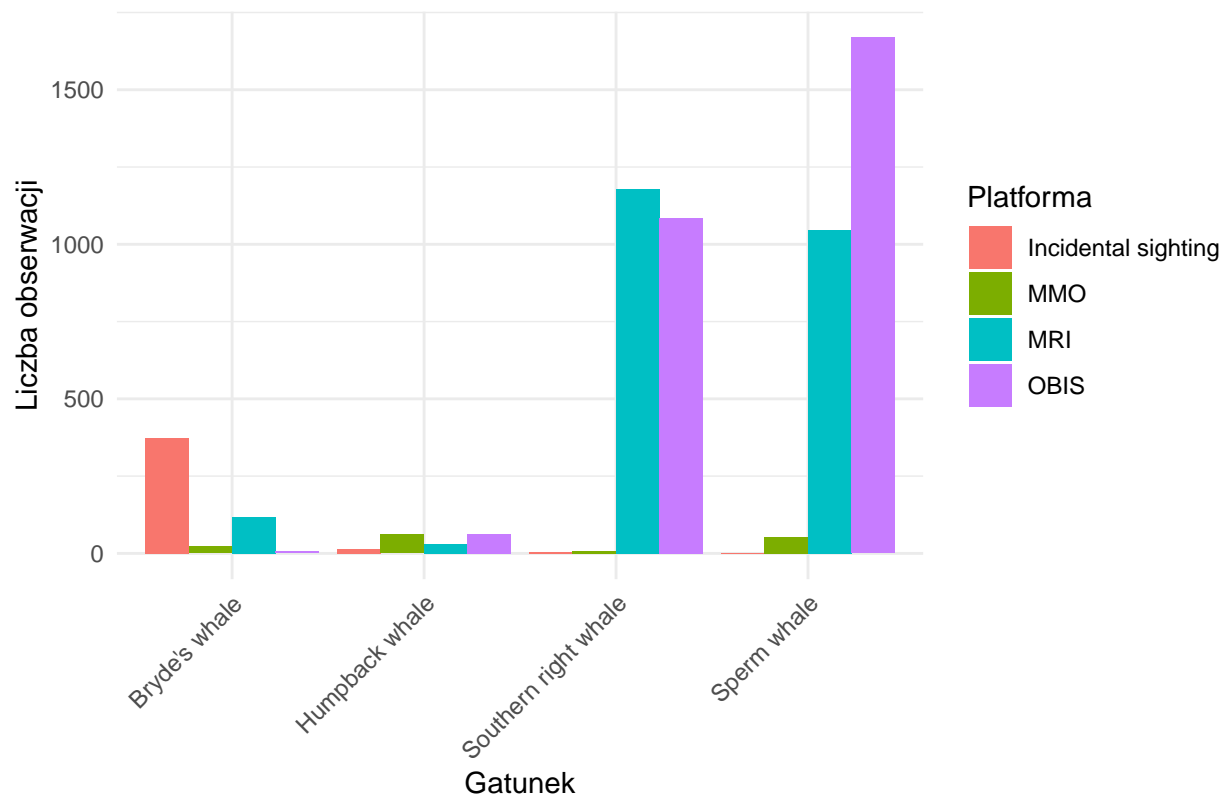
"MMO" jest główną platformą dla obserwacji Humpback whale. Natomiast "OBIS" dominuje w obserwacjach Southern right whale i Sperm whale.

#Analiza z dplyr w sezonach

```
dane %>%
  group_by(Season) %>%
  summarise(Liczba_Obserwacji = n()) %>%
  ggplot(aes(x = Season, y = Liczba_Obserwacji, fill = Season)) +
  geom_bar(stat = "identity") +
  theme_minimal() +
  labs(title = "Liczba obserwacji w różnych sezonach", x = "Sezon", y = "Liczba obserwacji")
```

Liczba obserwacji w róznych sezonach
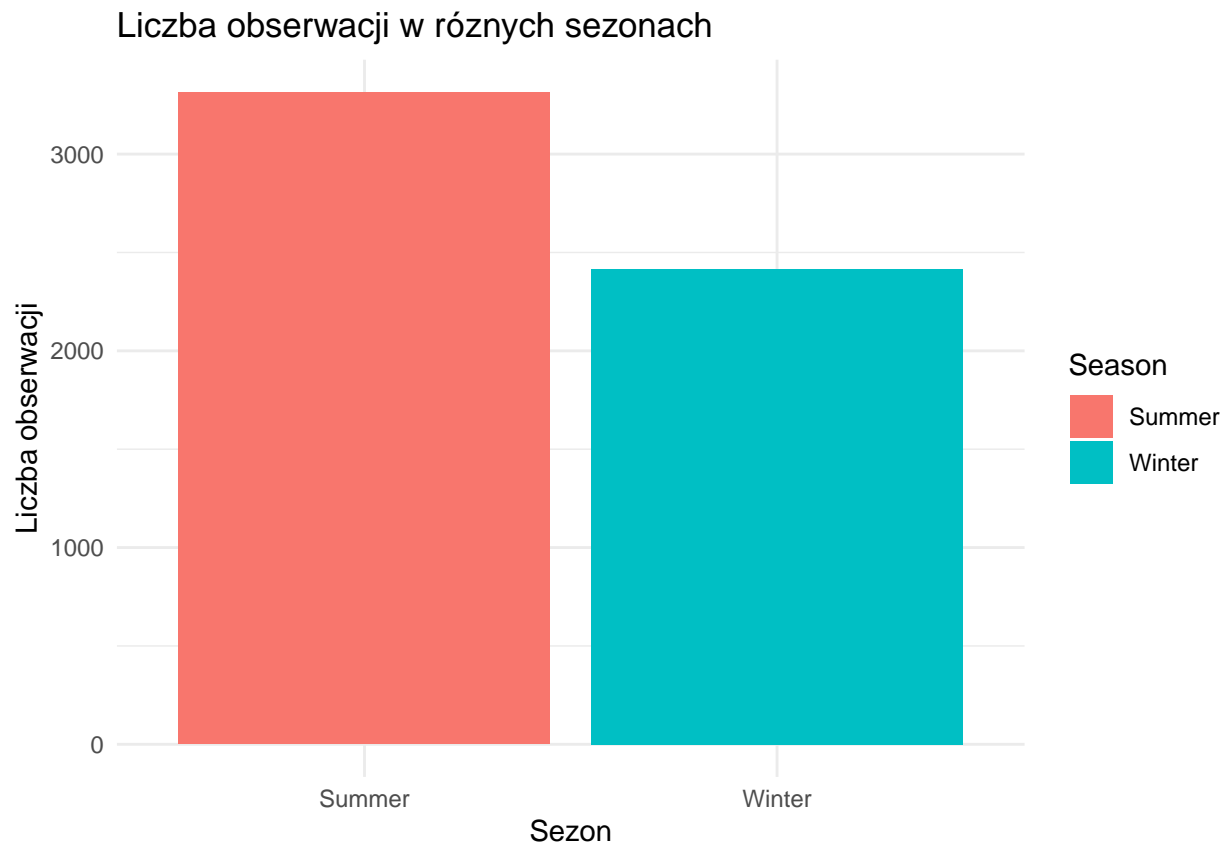
Więcej obserwacji dokonano latem.

Sezon a gatunek

```
dane %>%
  group_by(Species, Season) %>%
  summarise(Count = n(), .groups = 'drop') %>%
  ggplot(aes(x = Season, y = Count, fill = Species)) +
  geom_bar(stat = "identity", position = position_dodge()) +
  labs(title = "Sezonowość obserwacji różnych gatunków", x = "Sezon", y = "Liczba obserwacji") +
  theme_minimal()
```

Sezonowosc obserwacji róznych gatunków
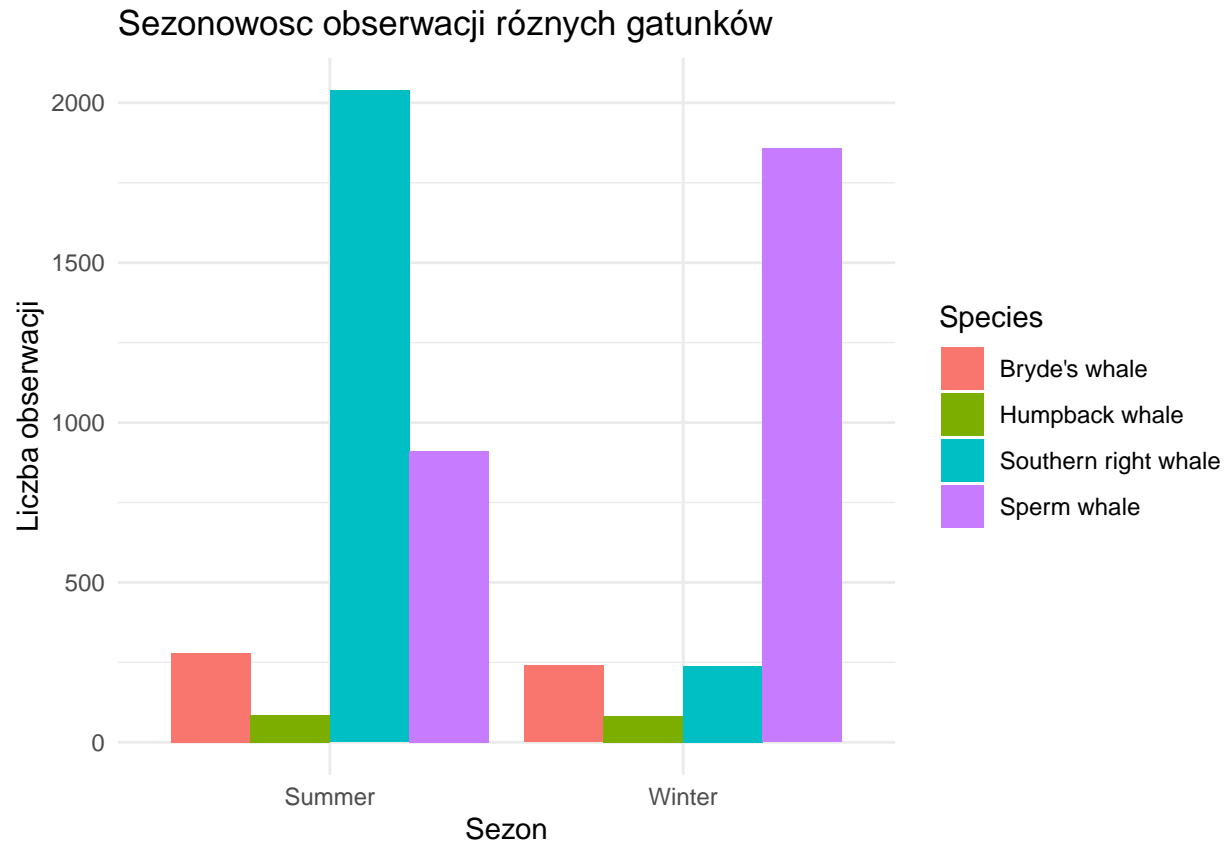
Sezonowo zmienia się liczebnośc obserwacji, zwl=łaszcza dla Southern right whale i Sperm whale.
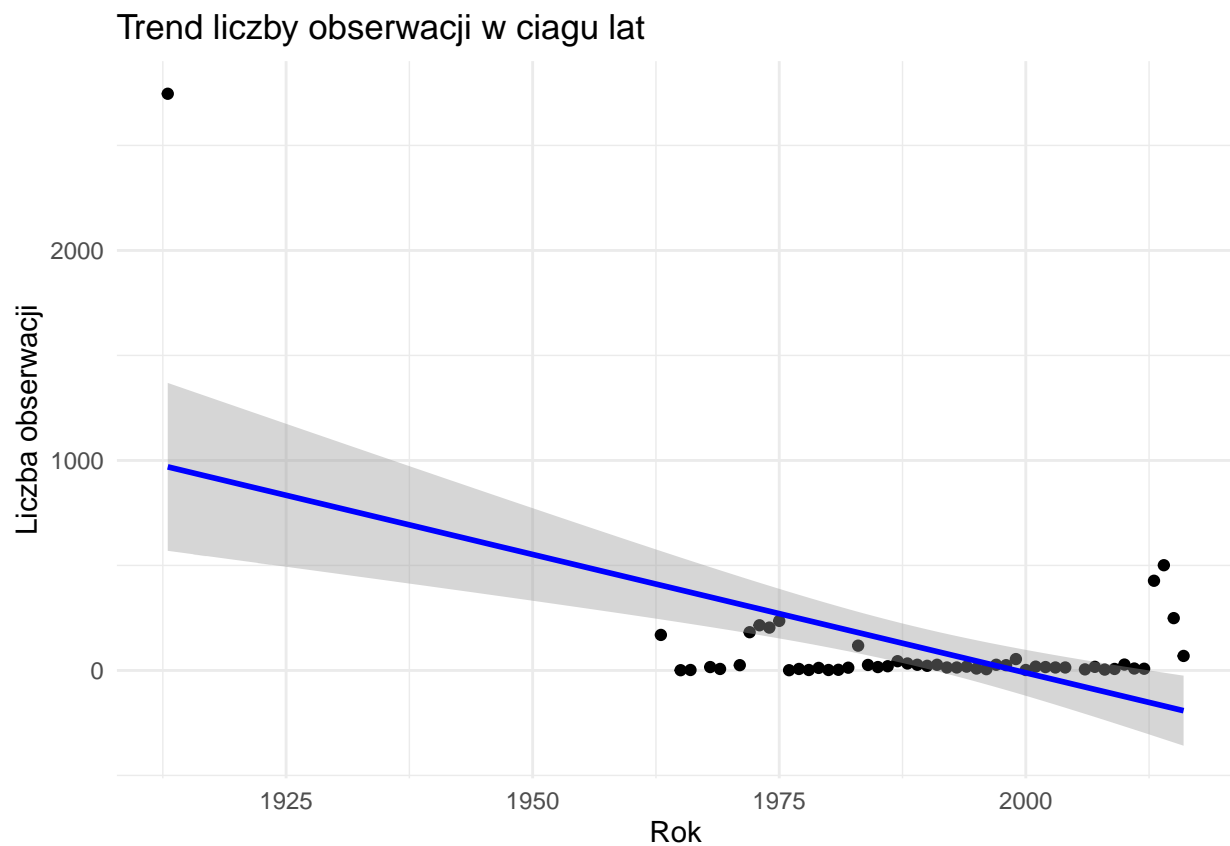
#Regresja

```
dane_regresja <- dane %>%
  mutate(Year = as.numeric(as.character(Year))) %>%
  group_by(Year) %>%
  summarise(Count = n(), .groups = 'drop')
regresja <- lm(Count ~ Year, data = dane_regresja)
summary(regresja)
```

```
##
## Call:
## lm(formula = Count ~ Year, data = dane_regresja)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -382.13 -160.73  -62.23   64.86 1776.70
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 22533.454   5059.856   4.453 4.89e-05 ***
## Year          -11.272      2.544  -4.431 5.26e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 333.4 on 49 degrees of freedom
```

```
## Multiple R-squared:  0.2861, Adjusted R-squared:  0.2715
## F-statistic: 19.64 on 1 and 49 DF,  p-value: 5.264e-05
```

```
ggplot(dane_regresja, aes(x = Year, y = Count)) +
  geom_point() +
  geom_smooth(method = "lm", color = "blue") +
  labs(title = "Trend liczby obserwacji w ciągu lat", x = "Rok", y = "Liczba obserwacji") +
  theme_minimal()
```

```
## 'geom_smooth()' using formula = 'y ~ x'
```


Analiza regresji liniowej sugeruje, że istnieje ujemny trend w liczbie obserwacji wielorybów w ciągu lat. Wyniki modelu pokazują, że średnia liczba obserwacji maleje.

#Prawdopodobienstwo zobaczenia na dane platformie

```
platform_prob <- dane %>%
  group_by(Platform) %>%
  summarise(Probability = n() / nrow(dane)) %>%
  arrange(desc(Probability))

print(platform_prob)
```

```
## # A tibble: 4 x 2
##   Platform        Probability
##   <chr>                 <dbl>
```

```
## 1 OBIS                    0.492
## 2 MRI                     0.414
## 3 Incidental sighting     0.0684
## 4 MMO                     0.0251
```

Platforma "OBIS" miała najwyższe prawdopodobieństwo obserwacji wielorybów (49.24%), podczas gdy platforma "MRI" zajęła drugie miejsce z prawdopodobieństwem wynoszącym 41.41%.

Wnioski

W analizie danych dotyczących obserwacji wielorybów stwierdzono istnienie wyraźnych wzorców związanych z ich geograficznym rozmieszczeniem, sezonowością oraz różnorodnością gatunków na różnych platformach obserwacyjnych. Skoncentrowanie się obserwacji w określonych szerokościach geograficznych sugeruje preferowane środowisko lub szlaki migracyjne dla wielorybów, podczas gdy zmienność w czasie może wskazywać na zmiany w migracjach lub zachowaniach tych zwierząt. Dodatkowo, różnice w liczbie obserwacji między platformami sugerują, że niektóre z nich mogą być bardziej efektywne w obserwacji określonych gatunków, co może być istotne dla planowania przyszłych badań i ochrony tych zwierzą