The Effects of Offshore Wind on Bottlenose Dolphin Strandings along the United States East Coast

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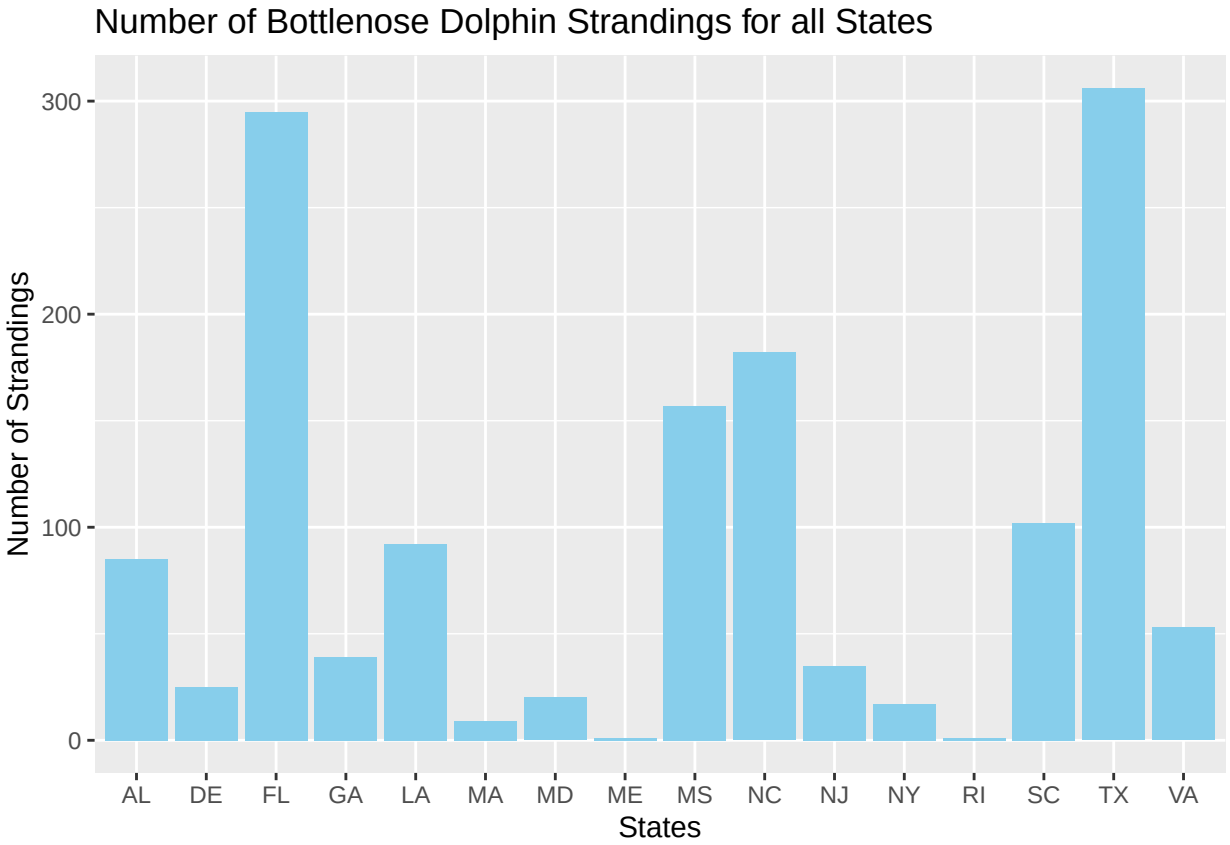
```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.3     v readr     2.1.4
## v forcats   1.0.0     v stringr   1.5.0
## v ggplot2   3.5.0     v tibble    3.2.1
## v lubridate 1.9.3     v tidyr     1.3.0
## v purrr     1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
## Registered S3 method overwritten by 'GGally':
##   method from
##   +.gg   ggplot2
```

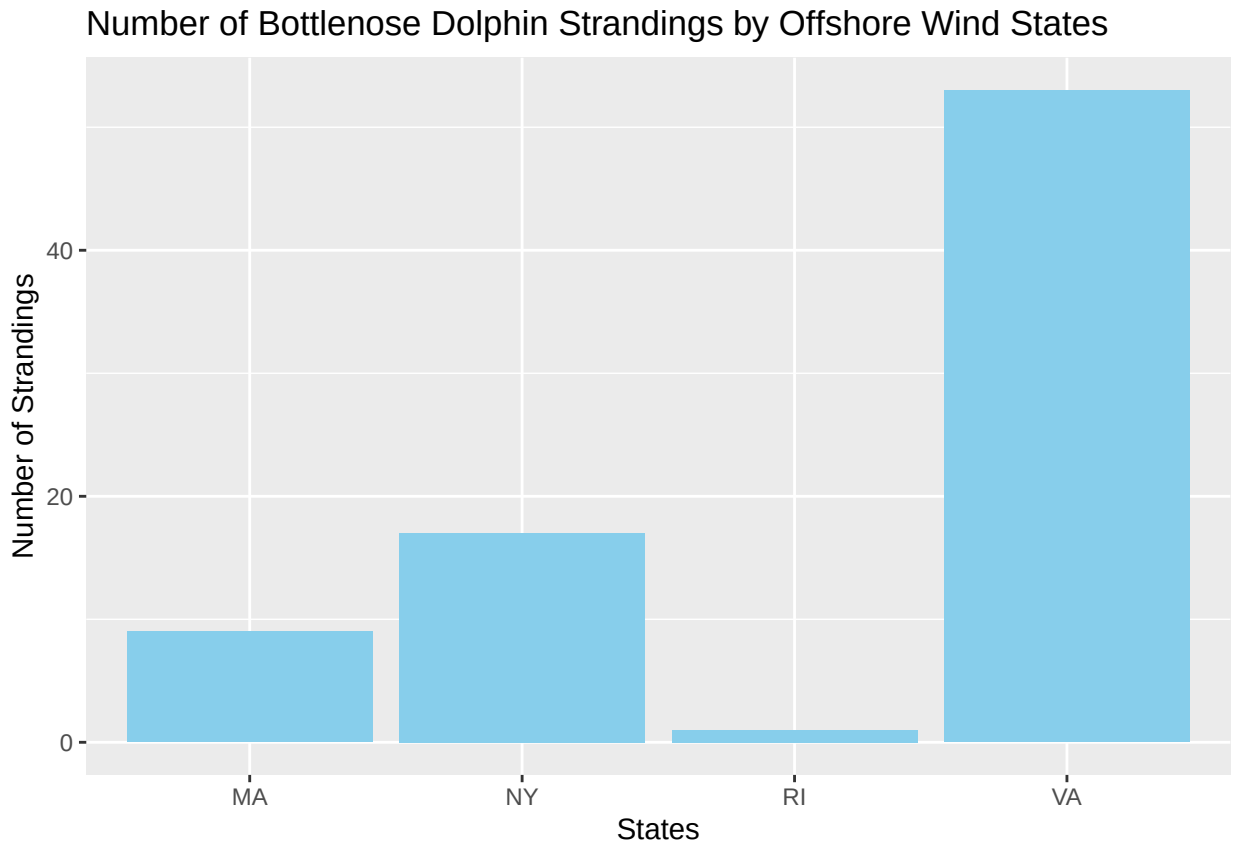
```
## [1] 80
```

```
## [1] 1419
```

```
##     State           Year.of.Observation     Sex             Age.Class
##  Length:1419        Min.   :2017        Length:1419        Length:1419
##  Class :character   1st Qu.:2017        Class :character   Class :character
##  Mode  :character   Median :2018        Mode  :character   Mode  :character
##                     Mean   :2018
##                     3rd Qu.:2019
##                     Max.   :2019
##      Length      turbine_presence
##  Min.   :  0.0   Min.   :0.00000
##  1st Qu.:134.0   1st Qu.:0.00000
##  Median :209.0   Median :0.00000
##  Mean   :194.2   Mean   :0.05638
##  3rd Qu.:248.0   3rd Qu.:0.00000
##  Max.   :366.0   Max.   :1.00000
```

```
##
##  AL  DE  FL  GA  LA  MA  MD  ME  MS  NC  NJ  NY  RI  SC  TX  VA
##  85  25 295  39  92   9  20   1 157 182  35  17   1 102 306  53
```


Number of Bottlenose Dolphin Strandings for all States
Number of Strandings
300
200
100
0
AL
DE
FL
GA
LA
MA
MD
ME
MS
NC
NJ
NY
RI
SC
TX
VA
States

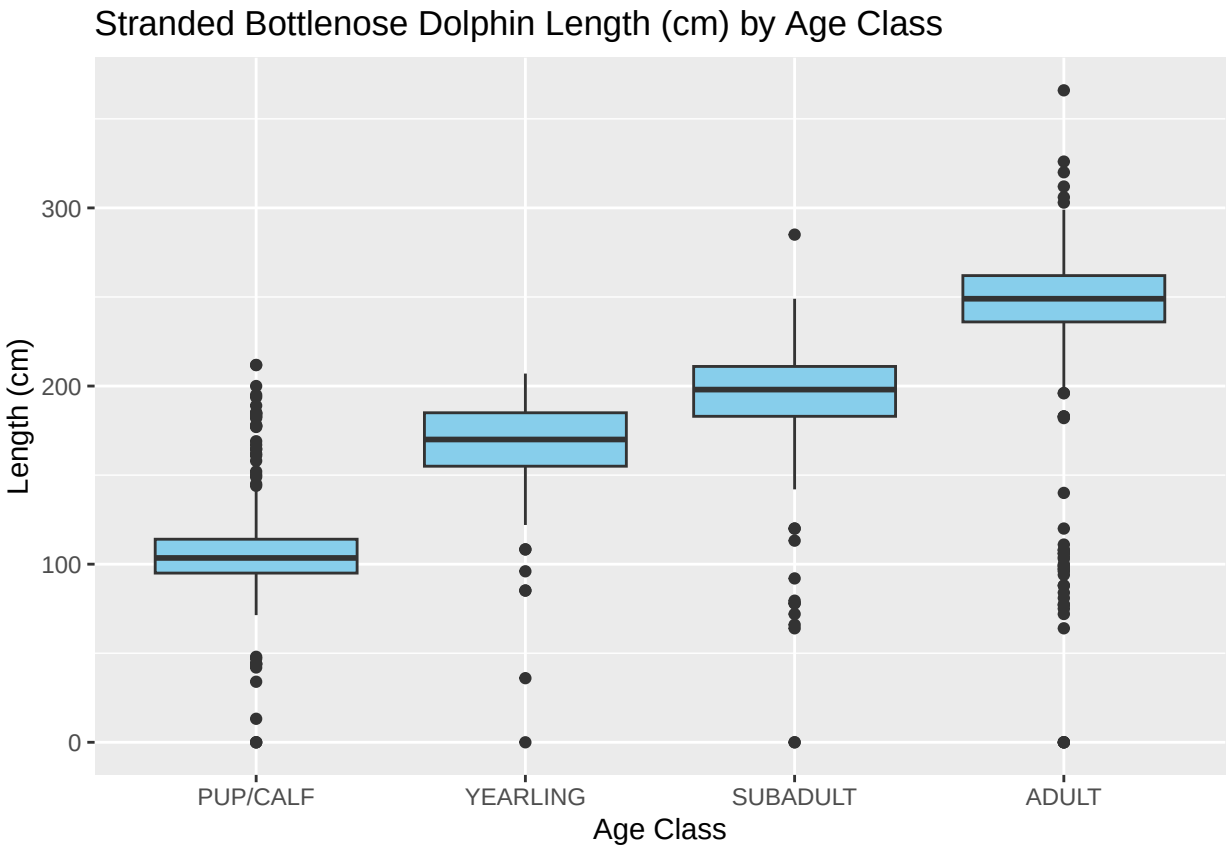


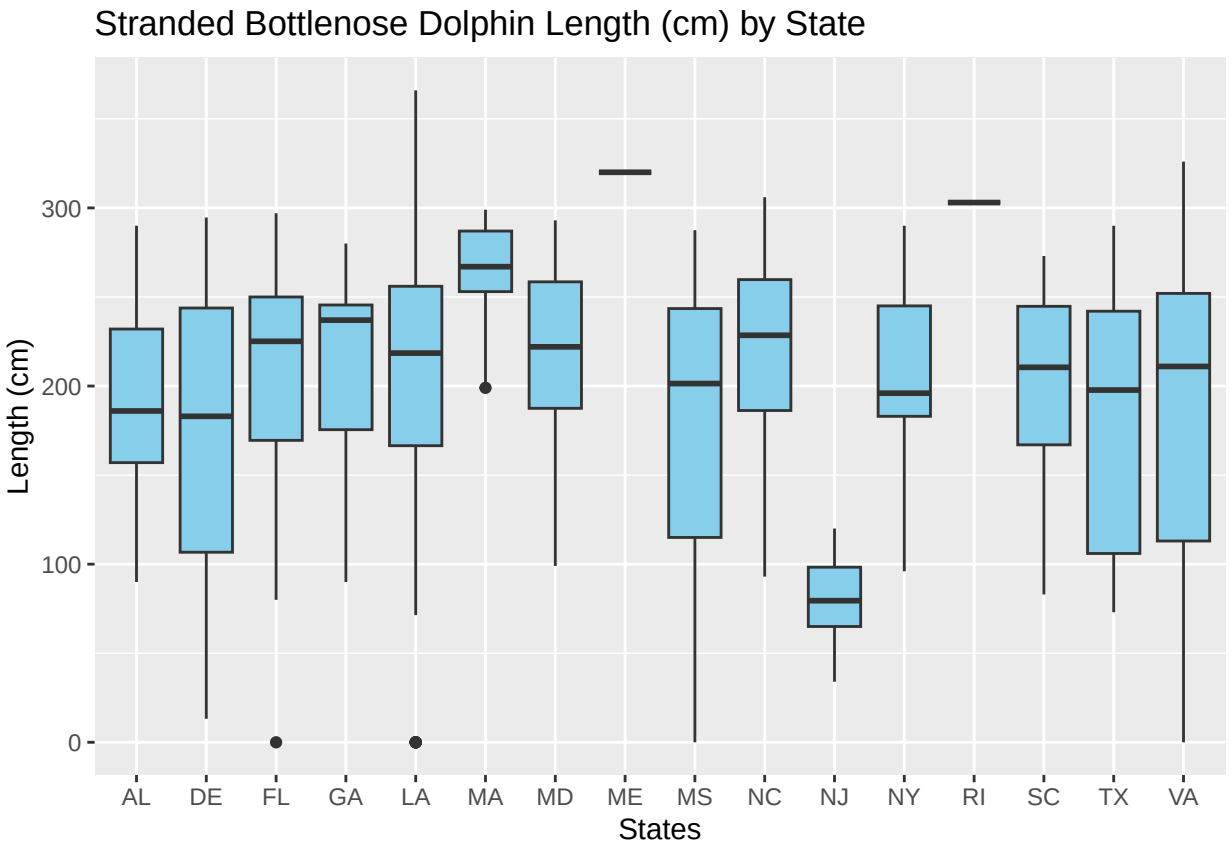

```
## [1] 194.2091
```

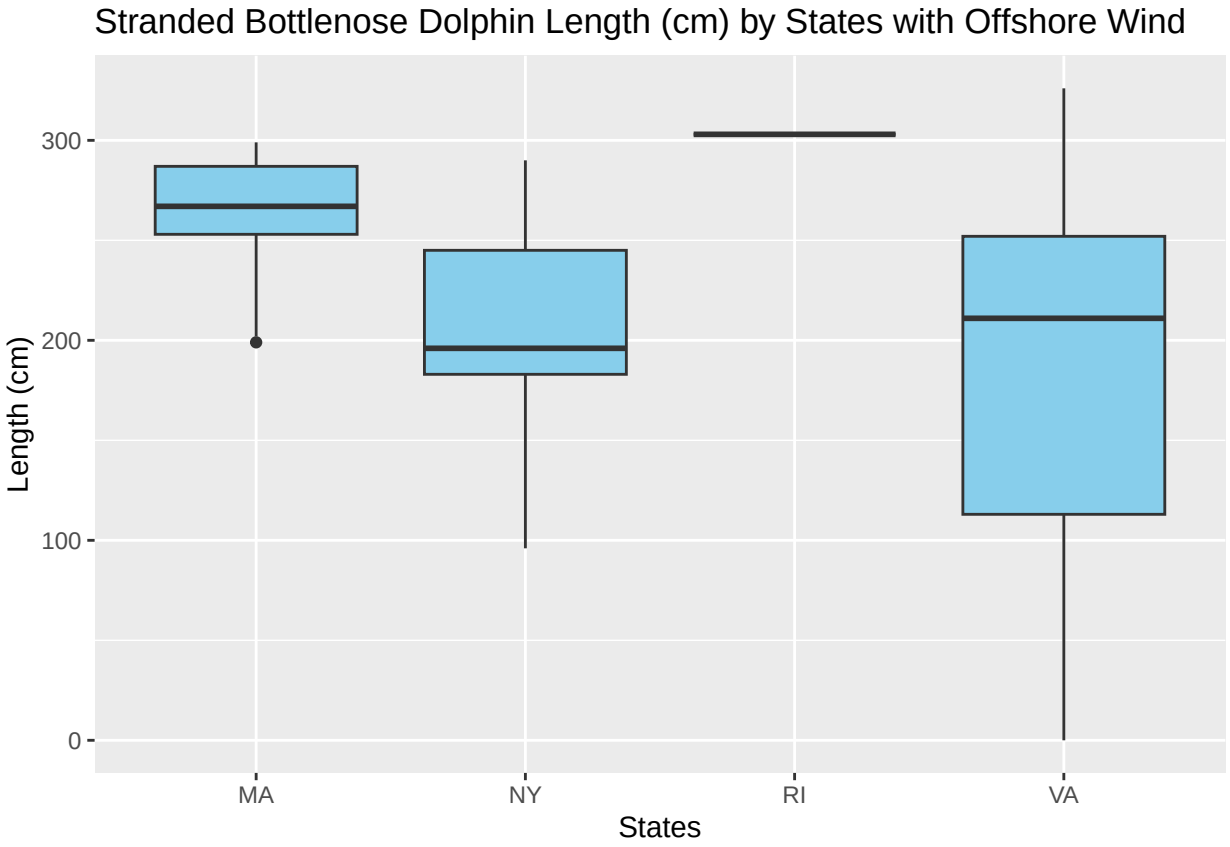
```
## [1] 198.175
```

```
## [1] 4270.962
```

```
## [1] 6133.309
```


Stranded Bottlenose Dolphin Length (cm) by Age Class
Length (cm)
300
200
100
0
PUP/CALF
YEARLING
SUBADULT
ADULT
Age Class

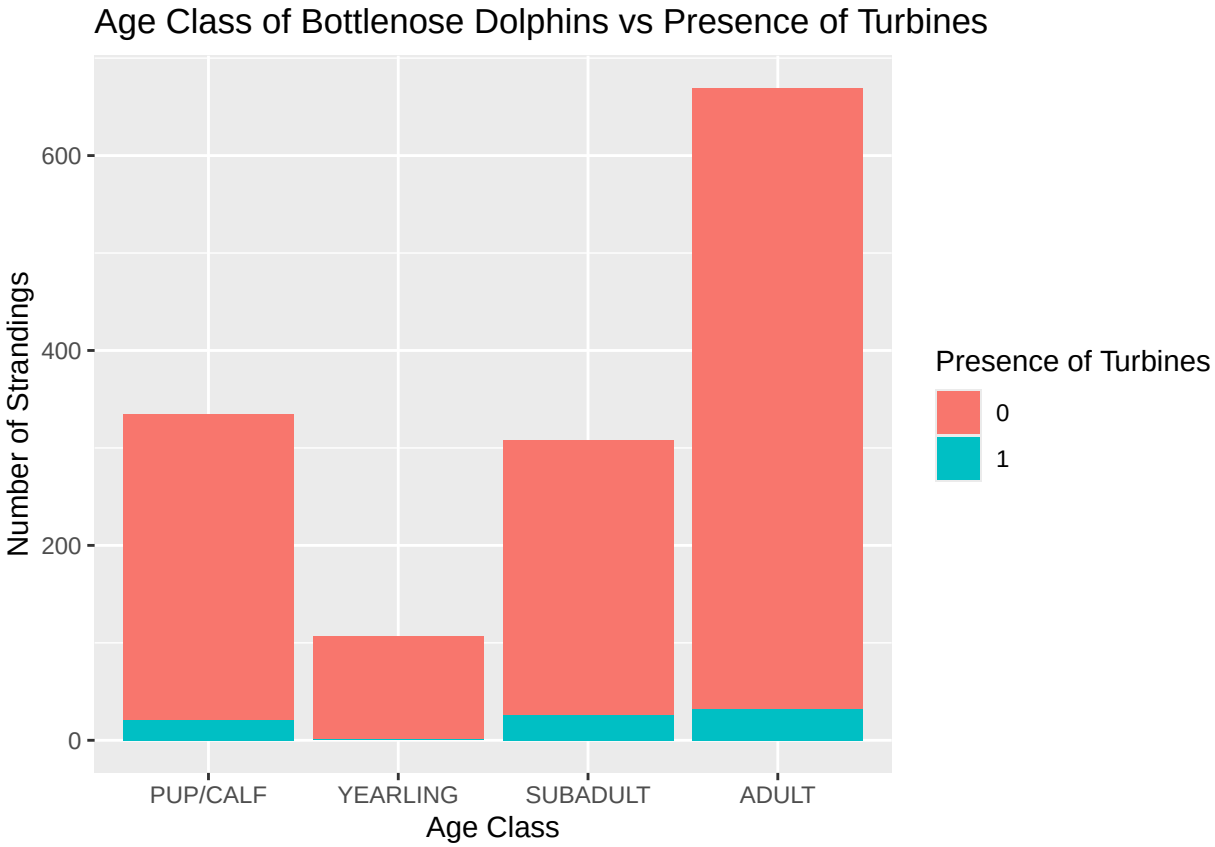

Stranded Bottlenose Dolphin Length (cm) by State
Length (cm)
300
200
100
0
AL
DE
FL
GA
LA
MA
MD
ME
MS
NC
NJ
NY
RI
SC
TX
VA
States




```
##   Age.Class   Length
## 1     ADULT 242.8233
## 2  PUP/CALF 107.1709
## 3  SUBADULT 194.0060
## 4  YEARLING 163.3439
```

```
##
##    ADULT PUP/CALF SUBADULT YEARLING
##      669      335      308      107
```

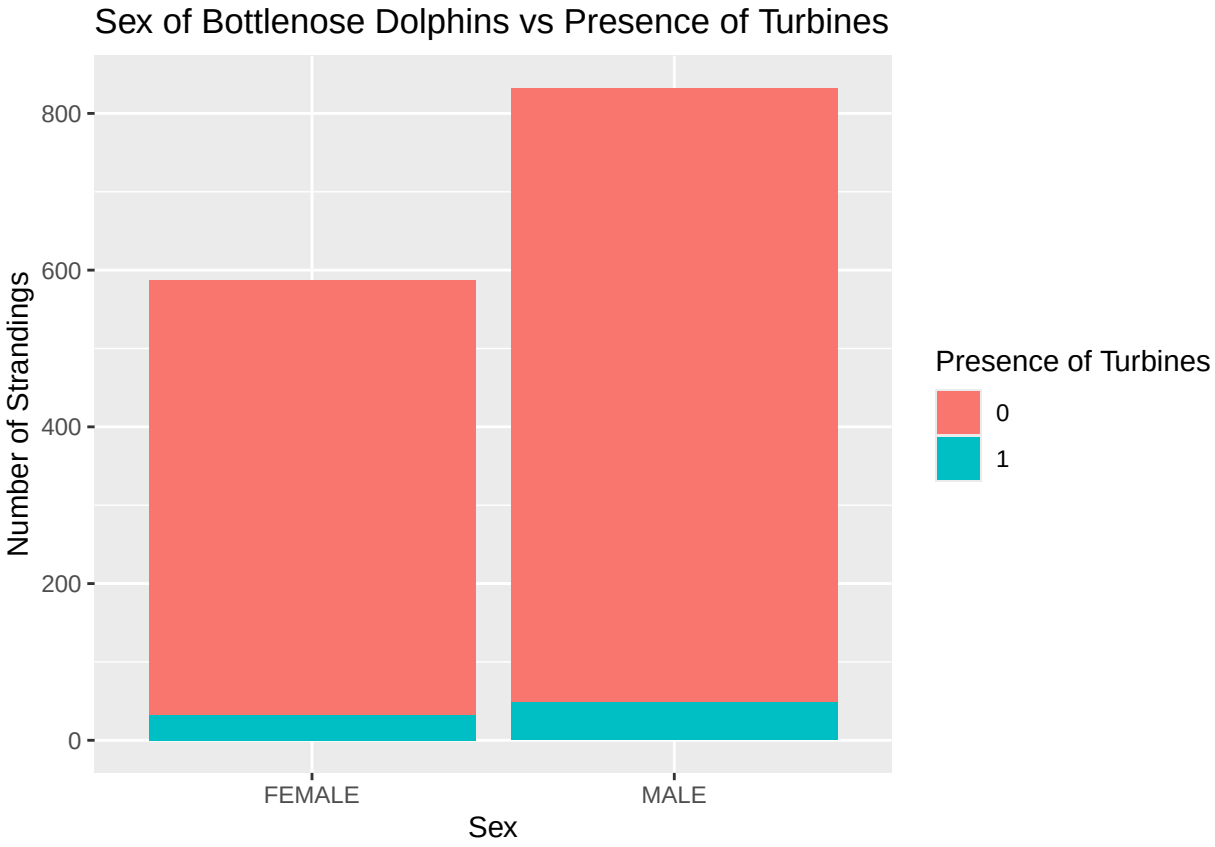
```
##   Age.Class turbine_presence
## 1     ADULT               32
## 2  PUP/CALF               21
## 3  SUBADULT               26
## 4  YEARLING                1
```




```
##      Sex   Length
## 1 FEMALE 191.8816
## 2   MALE 195.8511
```

```
##
## FEMALE   MALE
##    587    832
```

```
##      Sex turbine_presence
## 1 FEMALE               32
## 2   MALE               48
```




```
##
## Call:
## lm(formula = turbine_presence ~ 1, data = cleaned_strandings)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.05638 -0.05638 -0.05638 -0.05638  0.94362
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.056378   0.006125   9.204   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2307 on 1418 degrees of freedom
```

```
##
## Call:
## glm(formula = turbine_presence ~ Age.Class, family = "binomial",
##     data = cleaned_strandings)
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)        -2.9910     0.1812 -16.510   <2e-16 ***
## Age.ClassPUP/CALF   0.2862     0.2892   0.990   0.3224
```

```
## Age.ClassSUBADULT   0.6072     0.2735   2.220   0.0264 *
## Age.ClassYEARLING  -1.6724     1.0209  -1.638   0.1014
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 615.51  on 1418  degrees of freedom
## Residual deviance: 603.61  on 1415  degrees of freedom
## AIC: 611.61
##
## Number of Fisher Scoring iterations: 7
```

```
##
## Call:
## lm(formula = Length ~ State, data = cleaned_strandings)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -204.59  -45.68   13.90   48.64  166.30
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  188.747      6.650  28.381  < 2e-16 ***
## StateDE      -16.521     13.950  -1.184 0.236508
## StateFL       15.847      7.548   2.099 0.035952 *
## StateGA       17.356     11.858   1.464 0.143541
## StateLA       10.951      9.225   1.187 0.235375
## StateMA       72.142     21.493   3.357 0.000810 ***
## StateMD       26.638     15.238   1.748 0.080663 .
## StateME      131.253     61.674   2.128 0.033496 *
## StateMS        1.064      8.257   0.129 0.897506
## StateNC       31.281      8.055   3.883 0.000108 ***
## StateNJ     -109.191     12.314  -8.867  < 2e-16 ***
## StateNY       12.159     16.290   0.746 0.455558
## StateRI      114.253     61.674   1.853 0.064159 .
## StateSC        9.081      9.005   1.009 0.313384
## StateTX       -8.427      7.518  -1.121 0.262504
## StateVA       -4.075     10.731  -0.380 0.704178
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 61.31 on 1403 degrees of freedom
## Multiple R-squared:  0.1291, Adjusted R-squared:  0.1198
## F-statistic: 13.86 on 15 and 1403 DF,  p-value: < 2.2e-16
```

```
##
## Call:
## lm(formula = Length ~ VA + NY + RI + MA, data = turbine_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -184.672  -61.876    8.211   62.328  141.328
##
```

```
## Coefficients: (1 not defined because of singularities)
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   260.89      25.02  10.425 2.62e-16 ***
## VA            -76.22      27.07  -2.816  0.00619 **
## NY            -59.98      30.95  -1.938  0.05632 .
## RI             42.11      79.14   0.532  0.59618
## MA                NA         NA      NA       NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 75.07 on 76 degrees of freedom
## Multiple R-squared:  0.1159, Adjusted R-squared:  0.08104
## F-statistic: 3.322 on 3 and 76 DF,  p-value: 0.02413
```

Introduction

Methodology

Results

Discussion/Results

Description of Participant Roles

Bibliography

Appendix

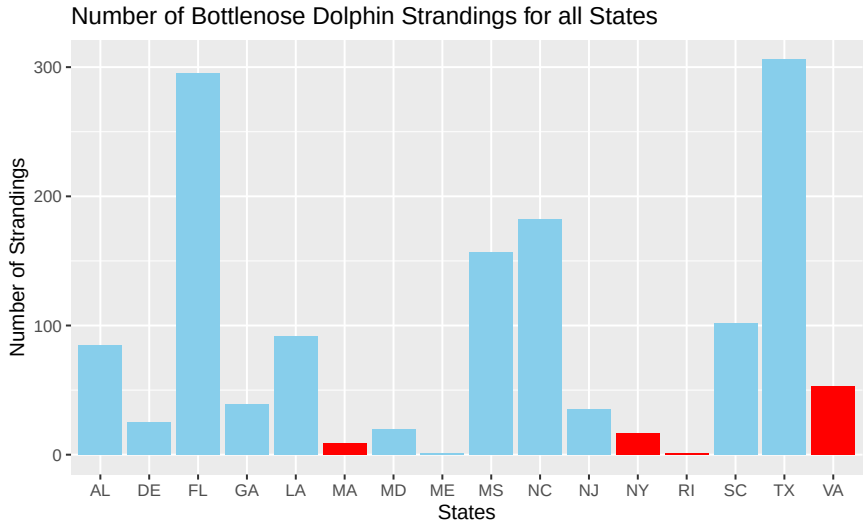


Figure 1: The number of stranded dolphins reported in each state across the East Coast. States with active offshore wind projects are labeled in red.

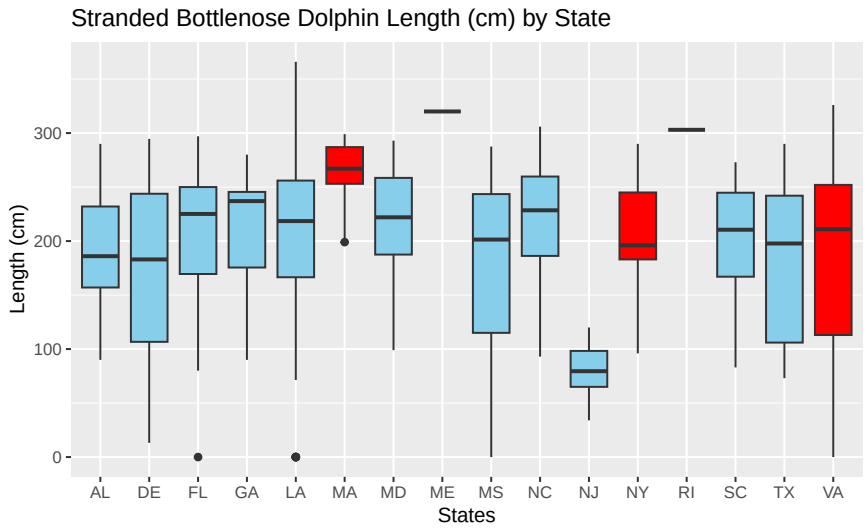


Figure 2: The distribution of length (cm) of stranded dolphins reported in each state across the East Coast. States with active offshore wind projects are labeled in red.

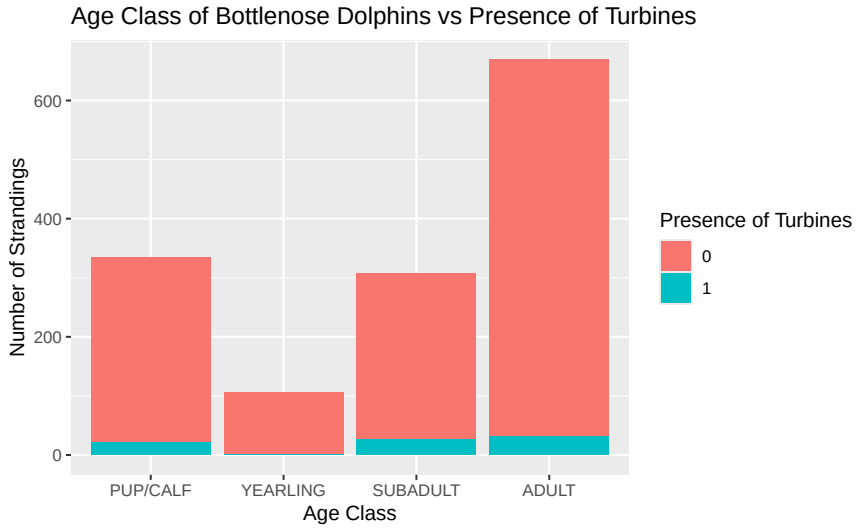


Figure 3: The number of strandings for each age class of bottlenose dolphin. Strandings from states with active offshore wind projects are labeled in blue (1) and strandings from the other states are labeled in red (0).

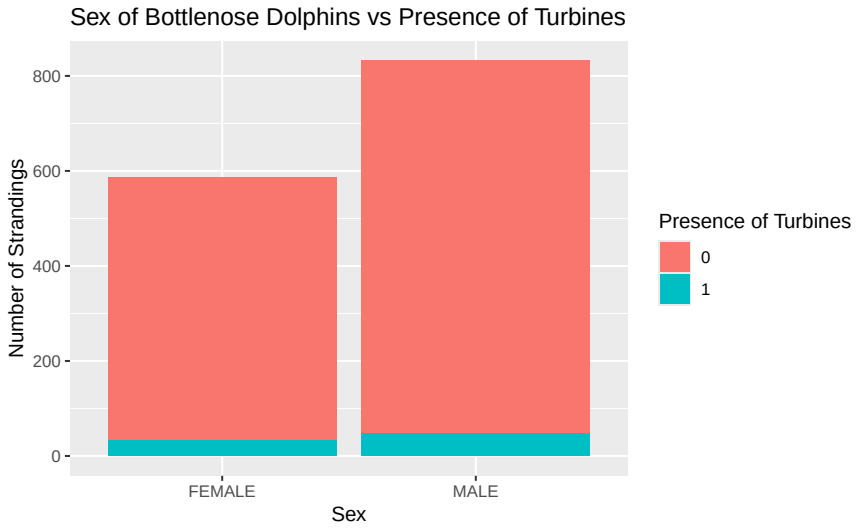


Figure 4: The number of strandings for each sex. Strandings from states with active offshore wind projects are labeled in blue (1) and strandings from the other states are labeled in red (0).