Final Model: Region + Season + Sex + Sizecm + Region:Season + Region:Sex + Season:Sex + Sex:Sizecm

**Akaike’s Information Criterion (AIC)**

Intercept occurred at the NorthEastCentral Region.

Parameters Reporting Notes:

Intercept was at -.376 for the NorthEastCentral Region.

A manatee located in the NorthWestCentral Region, versus the NorthEastCentral region changes the log likelihood of death by collision by -0.6879 with .7168 standard error.

Statistical Conclusion:

Scientific Conclusion:

1.) Checking for multicollinearity among your model predictors using VIF analysis may be appropriate as well.

2.) Checking for heteroskedasticity within your model may be useful by extracting the model residuals and checking them for normality (although this is debated for GLMs).

3.) Lastly, don't forget that if you have significant interactions between factors and continuous predictors, the single variables should no longer be interpreted as an "overall effect" on the dependent variable.  You should instead interpret the interactions.

Outline

Introduction:

* West Indian Manatees are an endangered animal, currently under review to be moved to threaten as of January 2016.
* Florida Fish and Wildlife Conservation Commission 1974. Biologist
* Over 20 percent of the deaths recorded from 1974 to 2015 have been caused by watercraft collisions. Which is quite alarming as 2147 / (897 + 984 + 242 + 24 + 26 + 5 +154 +119 +56 + 67)
* 26 percent of manatee deaths are directly related to human related causes. Although the data isn’t randomly sampled every manatee that is recovered and found regardless of the state of the manatee is recorded. So 10,057 deaths were recorded from manatees and 26 percent of them were caused by humans. 83 percent of those deaths are all caused by watercraft collision.
* I decided to explore if there are any characteristics of the manatees, their physiology and their environment such as the region and season that make manatees more likely to experience death by water craft collisions.

**Intro**

* West Indian Manatees are an endangered animal, currently under review to be moved to threaten as of January 2016.
* Florida Fish and Wildlife Conservation Commission 1974. Biologist
* From 1974 to 2015, 10,057 Recorded.
* 26 percent of manatee deaths are directly related to human related causes. 83 percent of those deaths are all caused by watercraft collision.
* Although the data isn’t randomly sampled every manatee that is recovered and found regardless of the state of the manatee is recorded.
* So 10,057 deaths were recorded from manatees and 26 percent of them were caused by humans

**Hypothesis:**

* H0: The occurrence of collisions in manatees does not differ with size, sex, region or season.

**Analyses:**

* **GLM (Change Slide)**
* **Akaike’s Information Criterion (AIC) STEP. (Change Slide)**
* **Dredge (MuMIN Dredge Function)**

**AIC / Dredge Results:**

**AIC:** Removed Sex:Season

**Dredge:** Compared to AIC

**Final Model**: Region + Season + Sex + Sizecm + Region:Season + Region:Sex + Season:Sex + Sex:Sizecm

Parameters Reporting Notes:

Intercept was at -.376 for the NorthEastCentral Region.

* A manatee located in the NorthWestCentral Region, versus the NorthEastCentral region changes the log likelihood of death by collision by -0.6879 with .7168 standard error.

**NDMS:**

* **Note:** Since there were some significant interactions between factors and the continuous predictor size, the individual variables can no longer be interpreted as an "overall effect" on the dependent variable.
  + Interpret their interactions.
* Having so many parameters with interactions makes it hard to interpret the relationships.
* Large dataset. NMDS could not run. (Sample Set)
* I would expect that if there exists a relationship of physiology and environment between the manatees that died from collision that they would appear to be more closely related.
* SLIDE CHANGE:
* For the most part the population of the manatees cannot be discerned from the population of the non-collisions.
* Does seem that the manatees are more similar within this bounds.

**Results:**

* NDMS results may be a little off ass it’s a random sample of all the data points which by the nature of the data may not be effective as different years had different counts, dates of death etc.
* Possible causes of error.
* Very likely that the analysis as a whole holds very little meaning.
* The other 80 percent of manatees found are dying from natural causes such as cold stress or at birth.
* Which most likely explains why there is not any real clustering that forms as manatees of the same regions and within the same seasons were generally more likely to die from something other than collisions.

**Conclusion:**

The model that was ran showed that that there was a model that could be used to reject the Null. **Final Model**: Region + Season + Sex + Sizecm + Region:Season + Region:Sex + Season:Sex + Sex:Sizecm

* Data not randomly sampled. So we can not definitely say that it represents all manatees. However, the data that was used was collected in a fairly unbiased way. All manatees that are found dead are collected.
* There was no random treatment. Manatee deaths are assessed. So no causal relationship could be extracted.
* **Results of the NDMS wasn’t compelling**..
* The physiology of the West Indian Manatee physiology and its environment aren’t related to collision in enough of a way that it matters.

To Do:

A more meaningful exploration may lie in analyzing the frequency distributions of manatees within different regions.

INTEREST:

* Interested in the distribution of death and how it varies by region.
  + Hoped that this information would have shown through in the analysis of having collisions modeled by death.
  + Confounded by the interactions in the model.
  + Regional Analyses of different death distributions could be meaningful.
* Just in the data alone the distributions appear different among regions. Some more interesting relationships may lie under there.
* For example, in the northern regions manatees die from cold stress more frequently. (**Red**)
* Perinatal is a lot higher in the Northwest region. (**Blue**)