**Analyzing the Penguin for Conservation Efforts**

**Methodology**

All data analysis was completed using python jupyter notebooks. This project focused on the penguin dataset from palmerpenguins. Packages imported and utilized to answer research questions include pandas, matplotlib.pyplot, andseaborn. Missing data was either omitted or updated to ‘Unkown’ utilizing penguins.dropna( ) and penguis[ ].fillna(‘Unkown’). Outliers were found utilizing sns.boxplot(); no potential outliers were found.

The research questions to be answered by analyzing the data include:

1. How many penguins are on each island?
2. How does body mass vary among the different species?
3. What is the relationship between flipper length and body mass among the different species?
4. What is the relationship between bill length and bill depth in penguins?
5. What is the overall penguin population trend at the islands over the course of the study?

To answer research questions, various bar charts, pie charts, boxplots, and scatterplots. The correlations between the different variables was found via corr(). The correlations were then visualized as heatmap.

**Results**

1. How many penguins are on each island?

Biscoe Island had the most number penguins, 48.83% (167). Torgersen Island had the least amount,

14.92% (51). Meanwhile, Dream Island contained 36.26% (124) of penguins sampled. When looking at the distribution of species among the islands it was determined that Gentoo penguins are only found on Biscoe Island, Chinstrap penguins are only located on Dream Island, and Adelie penguins are found on each of the islands. Additionally, each species on each island has a roughly equal (50/50) sex ratio.

1. How does body mass vary among the different species?

Gentoo penguins tend to be larger and heavier than Adelie and Chinstrap penguins. Adelie and Chinstrap penguins have similar body mass distributions, with Adelie penguins having a slightly larger range of body mass values. Additionally, males have a large body mass than females for each species.

1. What is the relationship between flipper length and body mass among the different species?

For each species, there is a strong positive correlation between flipper length and body mass in penguins (0.87). As flipper length increases, body mass tends to increase as well. Gentoo penguins had a larger body mass and longer flippers than Chinstrap and Adelie penguins.

1. What is the relationship between bill length and bill depth in penguins?

Overall, there is also a lot of variability in the data with a correlation between bill depth and length of -0.235. Some penguins have long bills but shallow depths, and vice versa. However, when a regression line is added to each species, there is a slight positive correlation.

1. What is the overall penguin population trend at the islands over the course of the study?

Biscoe island had the highest number of penguins in 2008 and lowest in 2007. Conversely, Dream

island had its highest number of penguins in 2007 and lowest in 2008.

**Conclusion**

Overall, the Palmer's Penguins dataset provides valuable information that can be used to inform conservation efforts for Adelie, Chinstrap, and Gentoo penguins in the Palmer Archipelago. When presenting this information, I would recommend protecting breeding, foraging, and hunting habitats for each species including land and marine habitats. With data collection over time, marine biologists cannot determine a clear trend in penguin count for each island. Discovering trends in populations will help determine what is impacting penguin populations to effectively aid in conservation efforts. This may involve establishing protected areas, regulating fishing and other marine activities in areas important to these penguins. Achieving this would be possible by continuing research and collaborating with local communities and stakeholders to raise awareness and build support for penguin conservation.