Avian Malaria and Pox Effects on Bird Species Population in Hawai'i

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Abstract

Avian Malaria and Avian Pox is infectious diseases that disrupt many non-native and native bird species in Hawai'i. It is an environmental problem that needs to be talked about more. This study is investigating 3 specific bird species in Hawai'i. This study looked at annual temperature changes in Hilo, Avian Malaria, and Avian Pox (old pox and active pox) to see if they related and if they affected the population of each species.

Background

Avian malaria is a disease caused by intracellular, mosquito-transmitted protozoan parasites and is transmitted through the bite of non-native mosquitoes. It is known for its devastation of native bird populations on the Hawaiian Islands. Avian pox is a viral infection caused by a large, double-stranded DNA virus that typically causes tumor-like swellings on exposed skin or lesions on infected birds' mouths, trachea, and esophagus. It can be transmitted mechanically through contact with infected objects. The most likely opportunity for the introduction of avian malaria was in the 1800's when local bird clubs introduced non native passerine birds from around the world to replace low-elevation native birds that were vanishing from pox infection and also mosquitos that came to the islands when people started living in Hawai'i.

Methods

- All data sets were public and very applicable to get from various websites.
- File types csv. and xlxs. data sets were used.
- Data collected and generated into R studio and aggregated in Excel.
- Performing a data analysis, a series of visuals were created, which include line plots and a barplot to show the effects of the diseases and how temperature could impact Hawai'is native bird species.

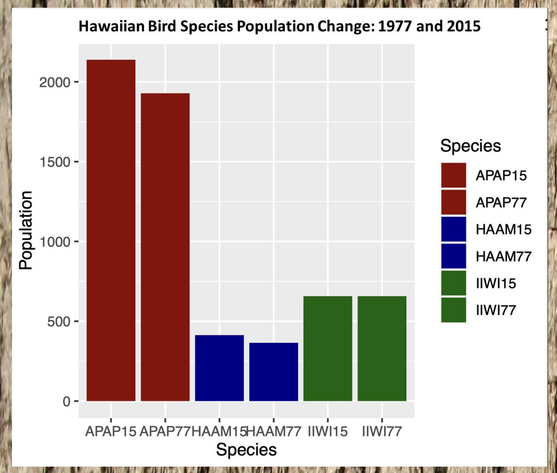

Figure 1: BAR PLOT SHOWING THE BIRD SPECIES POPULATION CHANGE FROM 1977 AND 2015

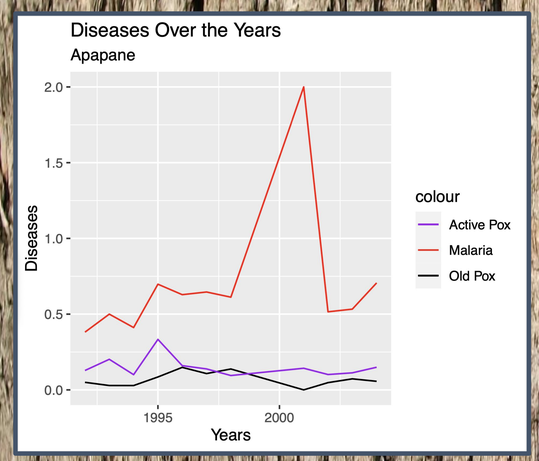

FIGURE 2: LINE GRAPH OF APAPANE SPECIES DIESASE AFFECTS

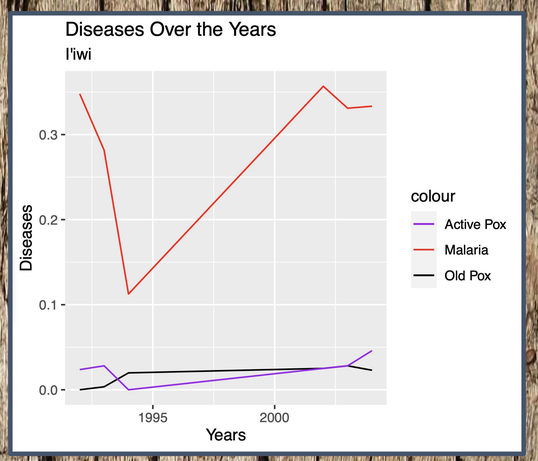

FIGURE 3: LINE GRAPH OF DISEASES ON I'IWI BIRD SPECIES

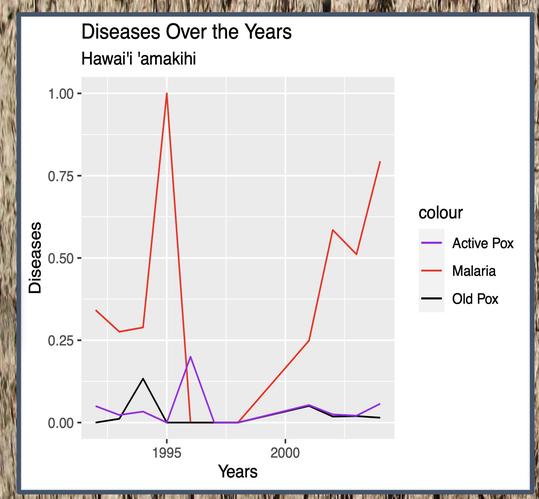

FIGURE 4: LINE GRAPH OF DISEASES ON HAWAI'I AMAKIHI BIRD SPECIES

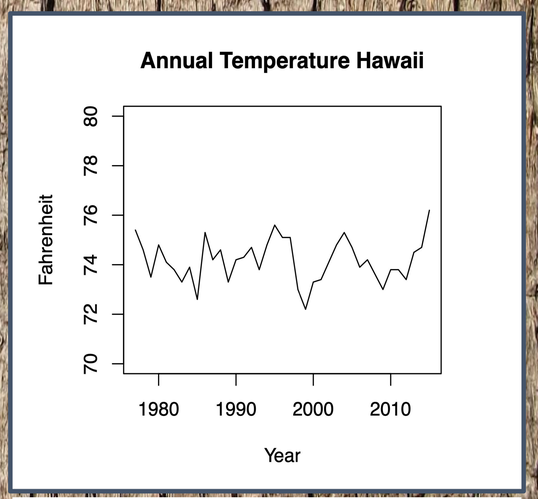

FIGURE 5: LINE GRAPH OF ANNUAL TEMPERATURE IN HILO, HAWAI'I

Hypotheses/Discussion

- H1: Avian Malaria and Avian Pox are related.
- The hypothesis of Avian Malaria and Avian Pox did not affect all three of the species. Still, this studies only showed that each species' population grew from 1977 to 2015.
- H2: Infectious disease decreases the populations of all 3 bird species in Hawai'i.
- Furthermore, this study have yet to find datasets with further research on population growth from 2016 to now. But based on the timeline, all 2 out of the 3 bird species, which include Apapane, Hawai'i amakihi, and I'iwi populations, increased. I'iwi kept the same amount for both years compared.

Limitations

- Looking at the annual temperature of Hilo from 1977 to 2015, it fluctuated in different temperatures throughout the years, changing the effects of Malaria. Still, it did not affect the overall population change.
- According to Plos One Article, even though there wasn't a decline in population change, those 3 species have a malaria tolerance of up to 75%. That is not for any of the other bird species in the dataset, which means that the other species in the data set could have quickly declined in population. There is still a need to care for malaria and pox disease in birds.

Future Directions

- Do further research and study the sites that the species are captured from and where they end up to see if that makes a difference in why the population is growing.
- Study and look at all hawaiian islands to figure out which island has the most avian malaria and avian pox effects on the species.
- Study other bird species in Hawai'i to make my study wider

References

Camp, R.J., Gorresen, P.M., Brinck, K.W., and Jacobi, J.D., (2018), Hawaii Island biodiversity trends across time and space, 1977 and 2015: U.S. Geological Survey data release, https://doi.org/10.5066/P9GTONFB.
National Oceanic Atmospheric Administration - Hawaii Online Weather Data, 1977 and 2015: Official data and data for additional locations are available from the Regional Climate Centers and NCEI. https://www.weather.gov/wrh/Climate?wfo=hfo

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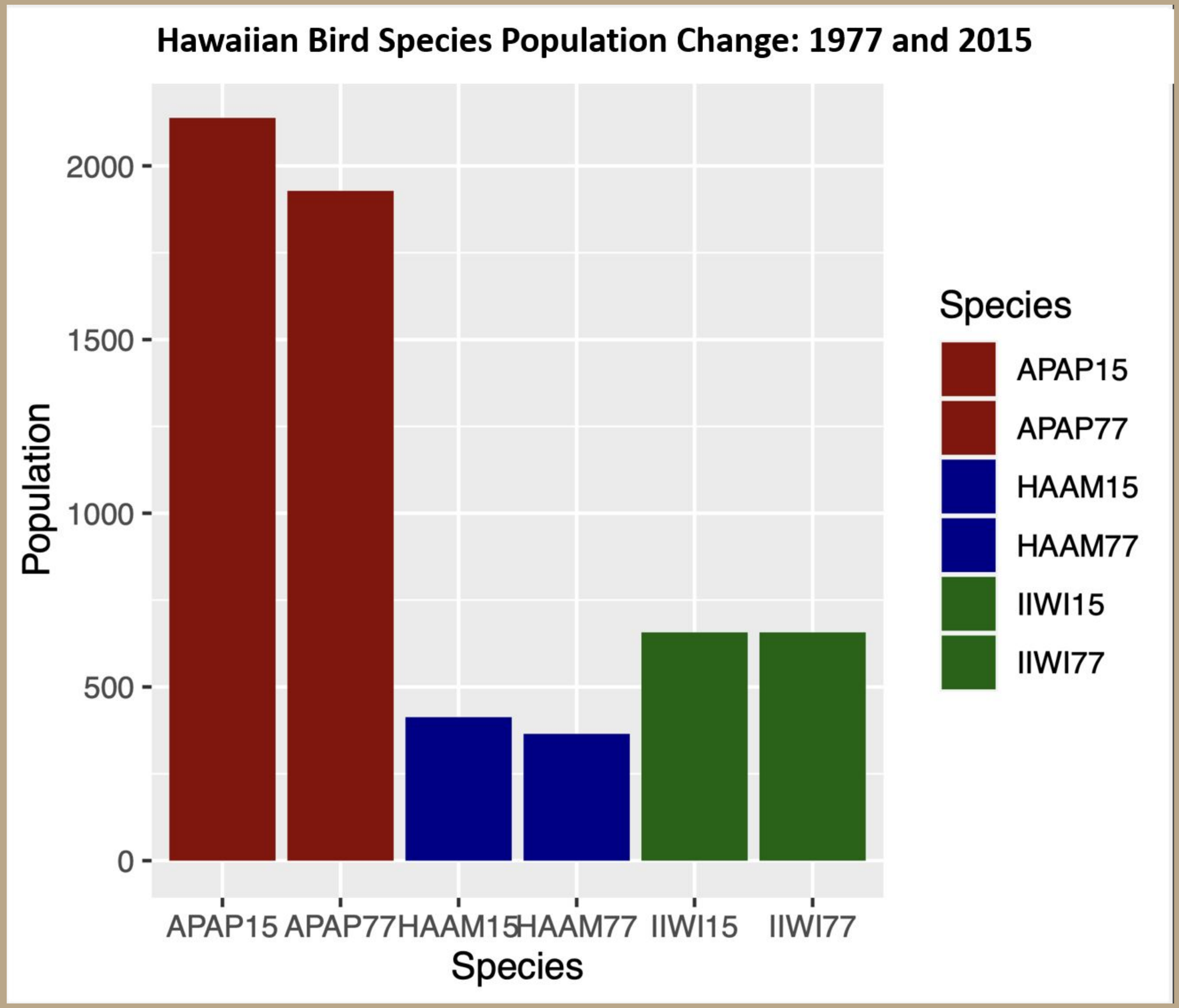

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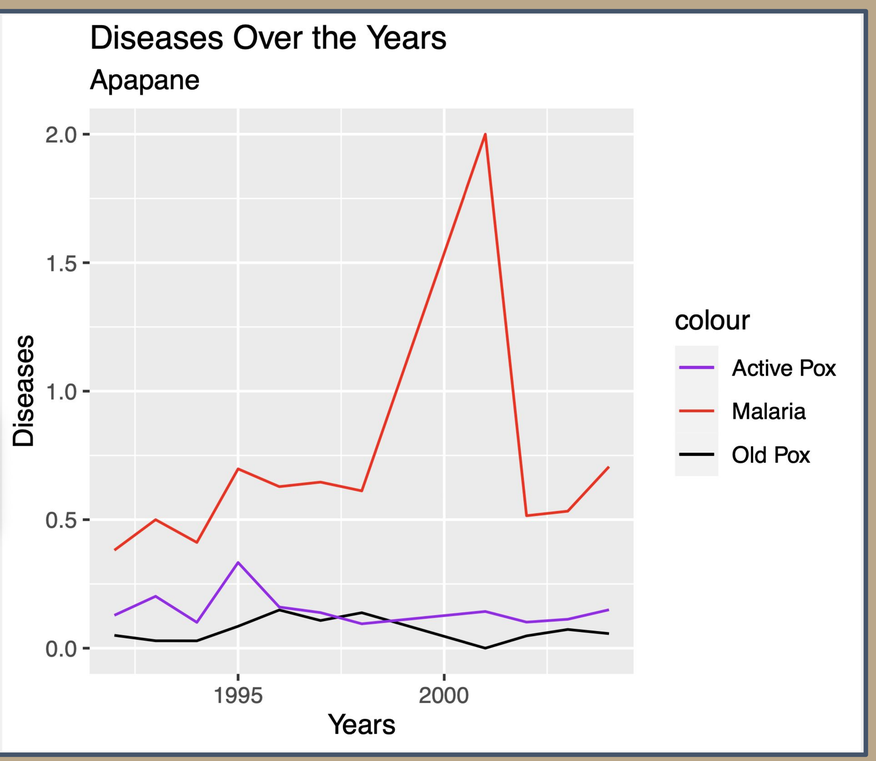

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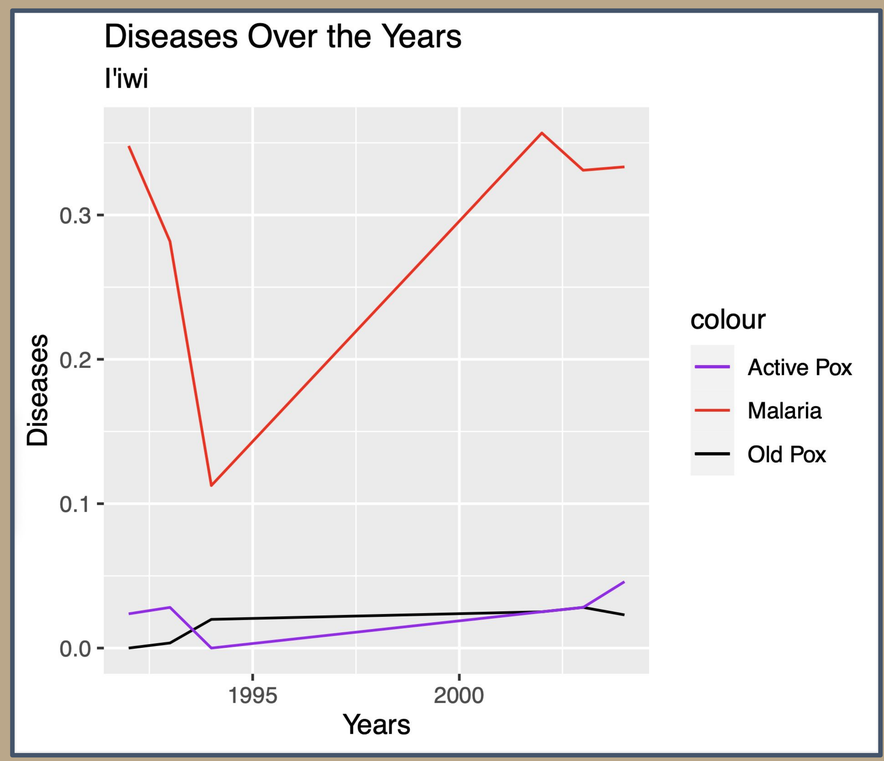

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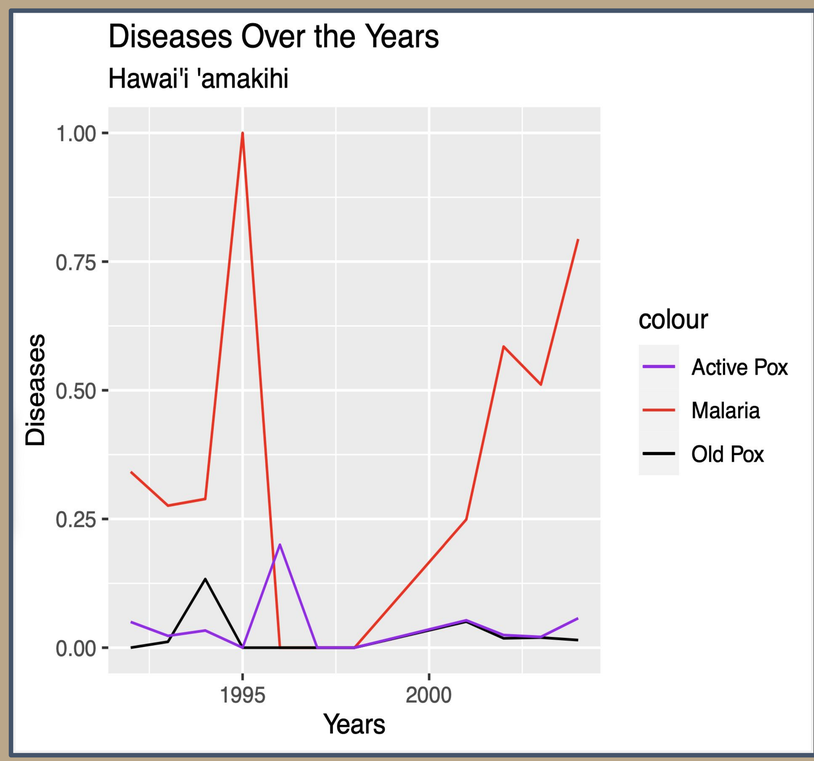

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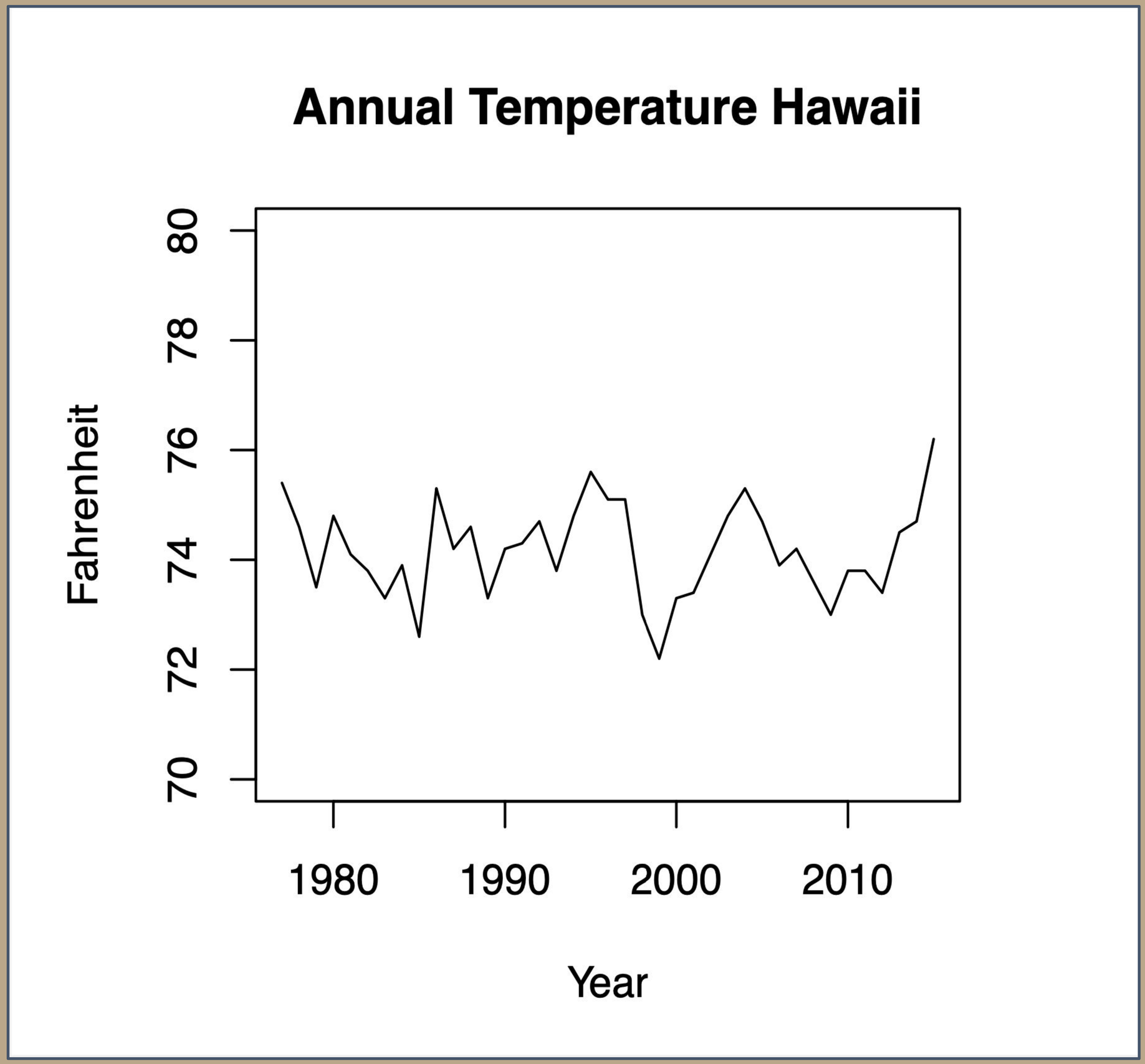

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THANK YOU!

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