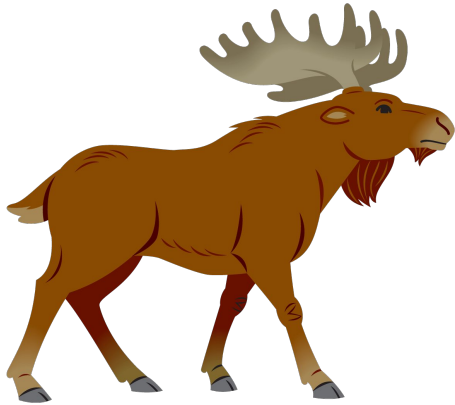




Wolves and Moose Of Isle Royale

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Objective



Help researchers and policymakers make better decisions about preservation and better understand predator-prey ecosystems by developing a predictive and explanatory model to answer:

- How do moose and wolf populations depend on one another on Isle Royale?
- What annual temperature increase is necessary to kill off moose population by 2050?



Methodology

We utilized data compiled by scientists between **1959-2019** on Isle Royale.



Assumptions

- ❖ Future populations will display **similar trends** to past populations.
- ❖ The Wolves grow if there are a certain number of Moose and vice versa, which we refer to as *Wolf and Moose thresholds*.
- After **63 degrees fahrenheit**, Moose will die off proportionally to temp.
- Yearly temperature increase is **constant**.

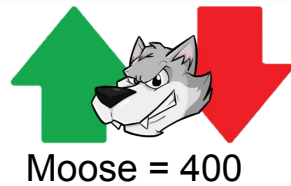
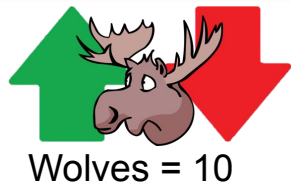
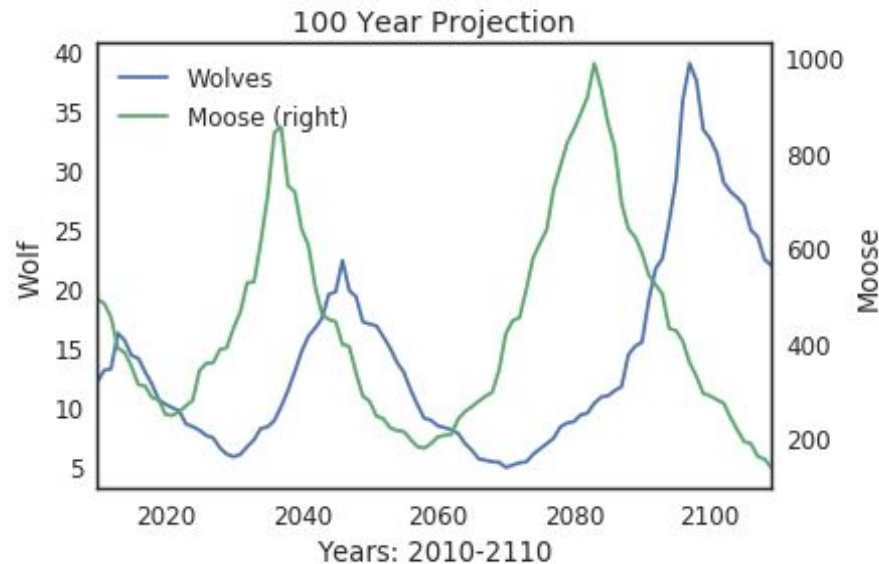


Update $f(x)$

- Randomly select a growth rate from two sets derived from data for each population.
- Use those growth rates, current populations and temperature to calculate the new population at time $(t+1)$.

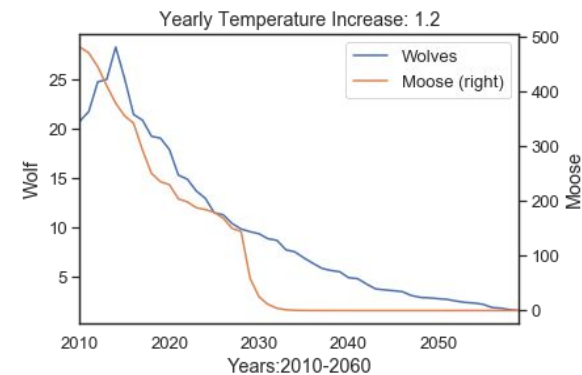
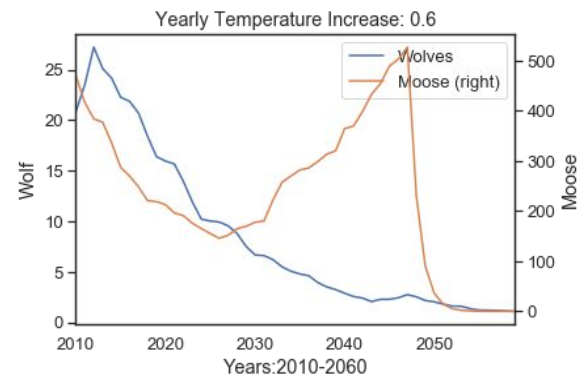
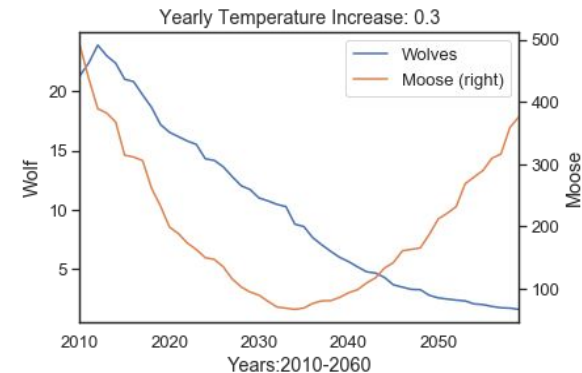
Results

Wolf-Moose Threshold Sweep

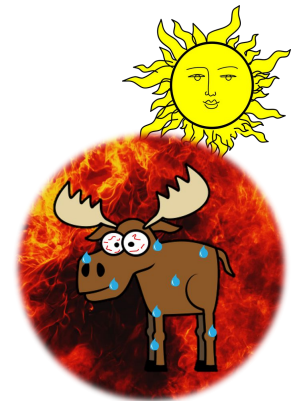


Probabilistic graph using Moose and Wolf inflection points, while disregarding the impact of temperature.

Temp. Increase Sweep



An increase of **0.6F** is required to kill the moose by 2050.





Conclusions



Our probabilistic model simulates populations realistically, and is within the bounds of the actual data . Our model is fruitful, accurate, but not precise.

Limitations:

Past growth might not represent future growth.

Temperature increase might not be constant.

Moose dying proportionally to temp increase.

- We do not consider the impact of global warming on wolves.
- We do not consider other natural disasters.

Possible Improvements:

predation rate

migration

carrying capacities

geographical location

seasonal behaviors