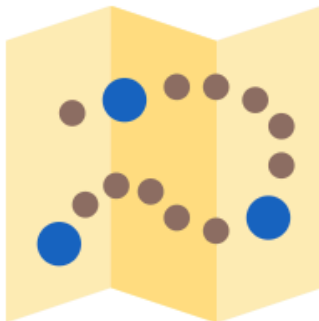# Analyzing Animal Movement

# Explaining, Protecting, and the Future of Understanding Animal Behavior

**An Animal Study White Paper**
Written by Matthew Hines, student

The Abstract

Analyzing elephant movement is important to discover information that can be used to protect and further understand the nature of the animal. The key features for studying movement of the elephants are water, temperature and elevation. The use of Feature Engineering, Clustering and Movement Modeling will be conducted. Feature Engineering will be conducted to add elevation and water data to the existing elephant data using google's APIs. The features with the elephant data will then be evaluated using HDBSCAN clustering algorithm. The elephant data will also be modeled using MoveHMM, Trajr and MoveVis packages.
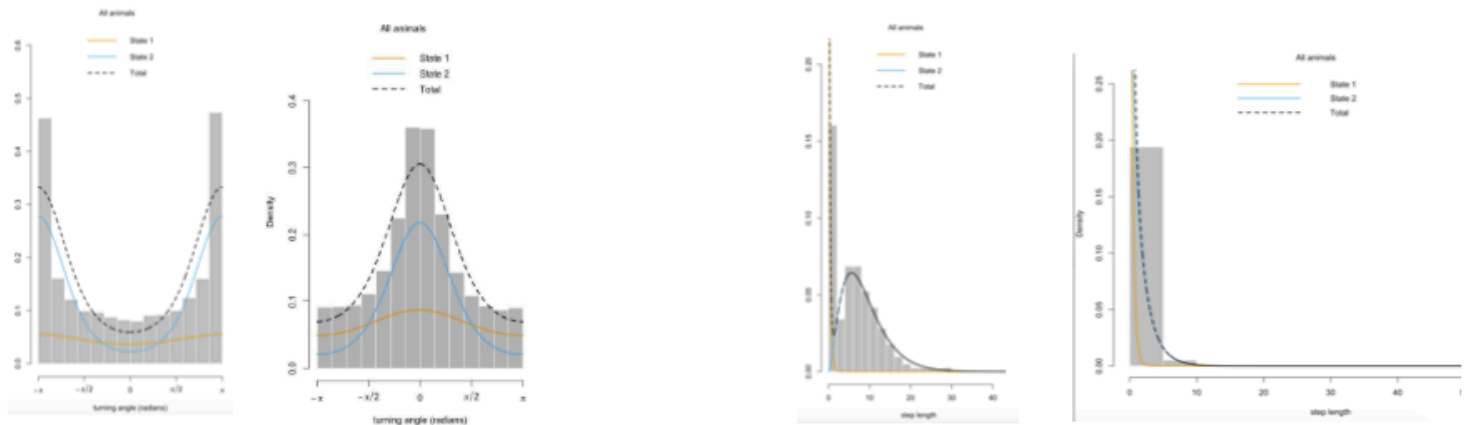
Animal movement is driven by two main factors of temperature and land features. Temperature has a strong influence on when and how long an animal forages or transits. Elephants' behavior is shaped by the environment.
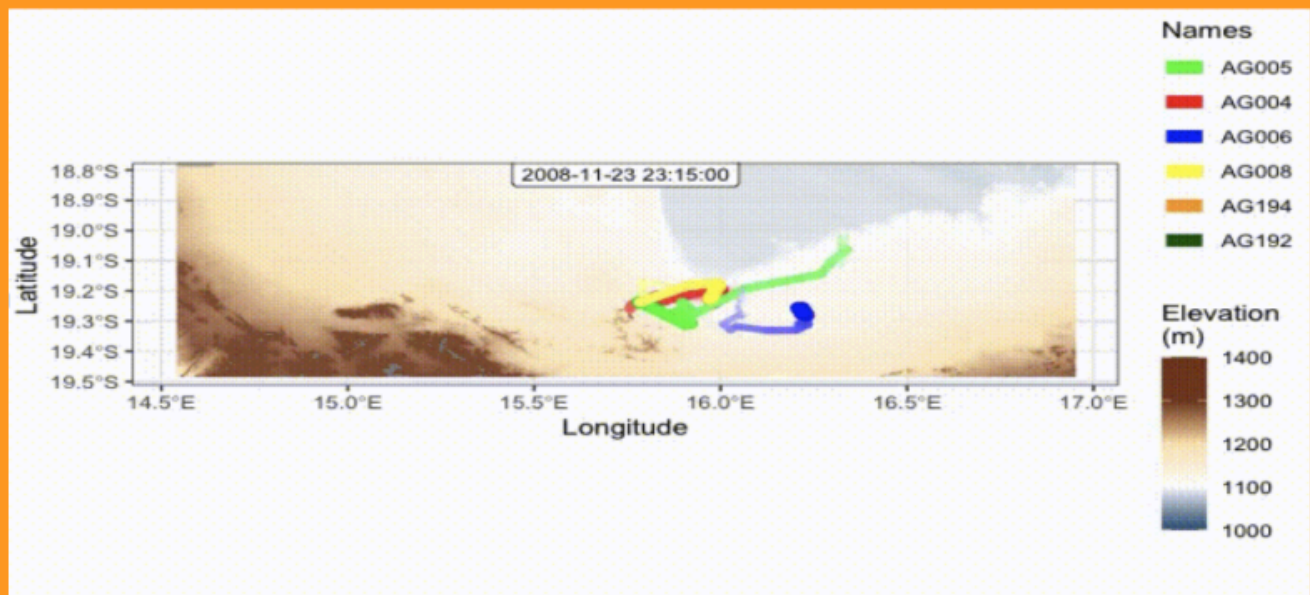
Etosha State Mapping

Transition probabilities
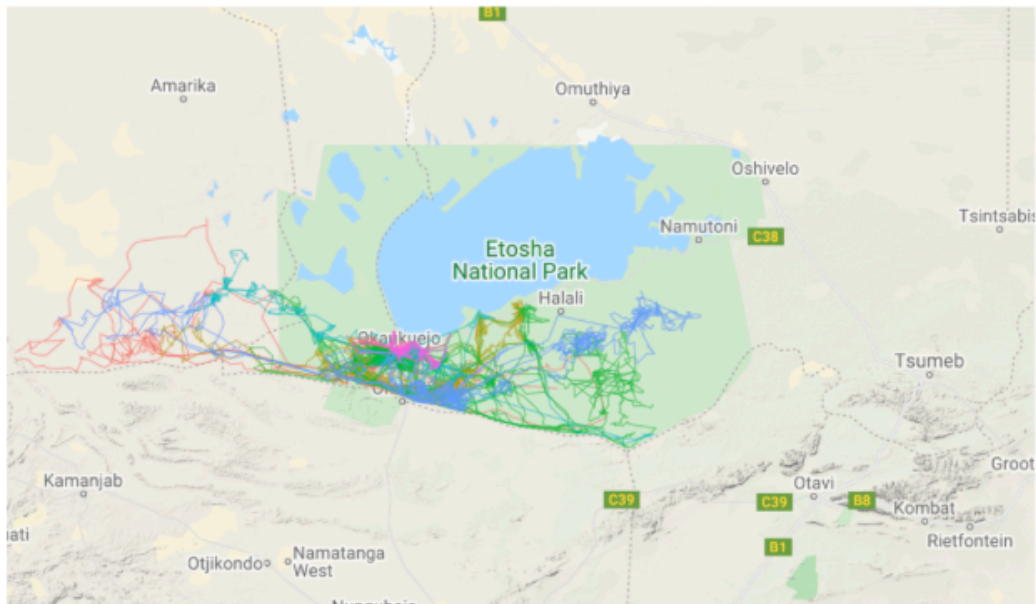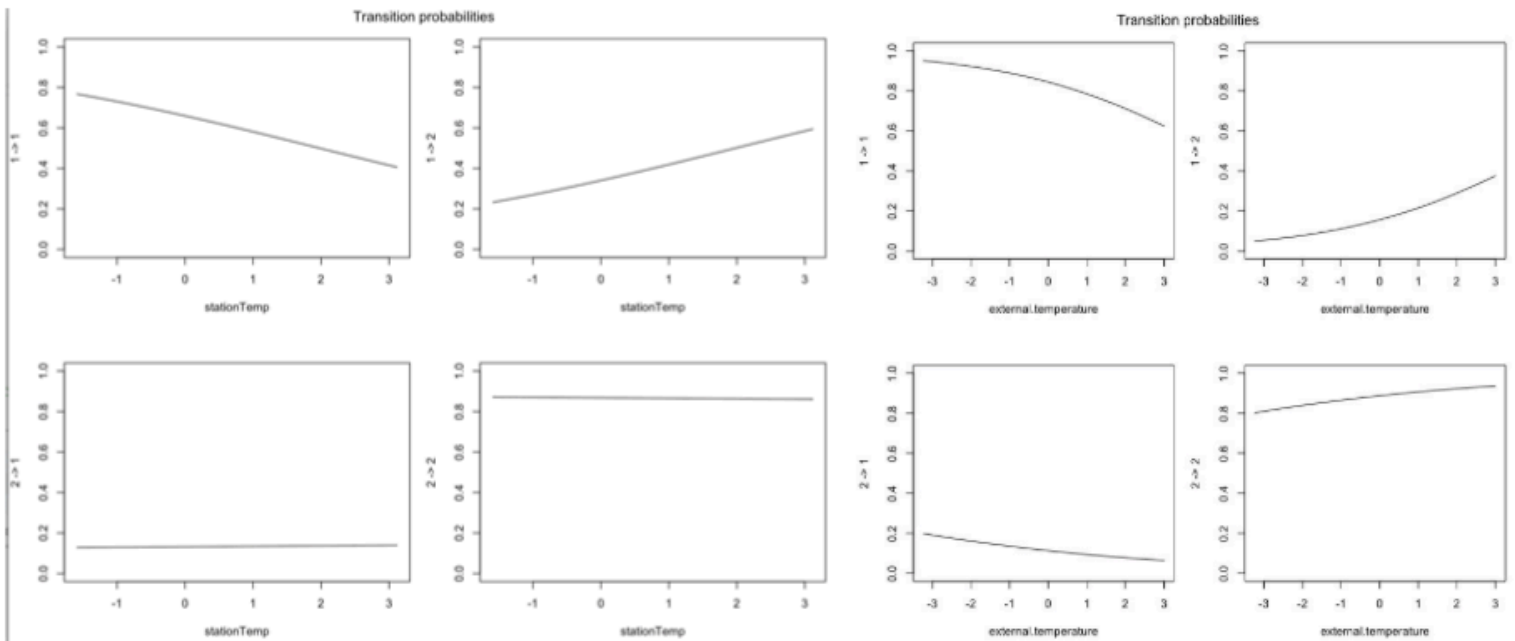
Jaguar Vs Elephant

Conclusions

The conclusions of this project give insight into how animals, specifically elephants, move. Animal movement is driven by two main factors of temperature and land features. Temperature has a strong influence on when and how long an animal forages or transits. Elephants' behavior is shaped by the environment. In Etosha, elephants displayed purposeful pathing towards human settlements. Additionally in both Etosha and Kruger National Park, elephants travel and confine themselves between areas of high elevation and significant water body/bodies. Extending the methods to Jaguar data revealed key differences in animal behavior and movement. Jaguars explore significantly less area versus elephants, but take larger steps. The methods explored in this paper have potential to be used to help explain, protect and predict animal movement.

Etosha Frame From Animation