Assignment 4_Species Distribution Model

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Objectives

The objective of this analysis is to model the destribution of saguaro cacti (Carnegiea gigantea) across locations with similar environmental conditions.

Methods

Species Information

Saguaro cacti are well known tall, almost tree-like cacti which grow in the Sonoran Desert in the southwestern United States. Like other cacti, saguaros have deep taproots and can store large amounts of water in order to survive hot, arid climates.

Statistical Analysis

Saguaro distribution was modelled using the BIOCLIM method. This modelling approach uses locations of known occurences of a species to identify locations with similar environmental conditions. In this way, locations are weighted based on their suitability for the survival of the species in question.

Results

Suitable locations for saguaro cacti calculated from the bioclim model reveal a potential distribution across parts of Nevada, Arizona, and Mexico (Figure 1). The suitable habitat estimated from this model were dependent on a minimum ocurence probability of the presence of saguaro projected over randomly selected areas with no true presence/absence observation (Table 1).

```
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## dimensions : 216, 144, 31104  (nrow, ncol, ncell)
## resolution : 0.04166667, 0.04166667  (x, y)
## extent     : -115, -109, 26, 35  (xmin, xmax, ymin, ymax)
## crs        : +proj=longlat +datum=WGS84 +ellps=WGS84 +towgs84=0,0,0
## source     : memory
## names      : layer
## values     : 0, 1  (min, max)
```

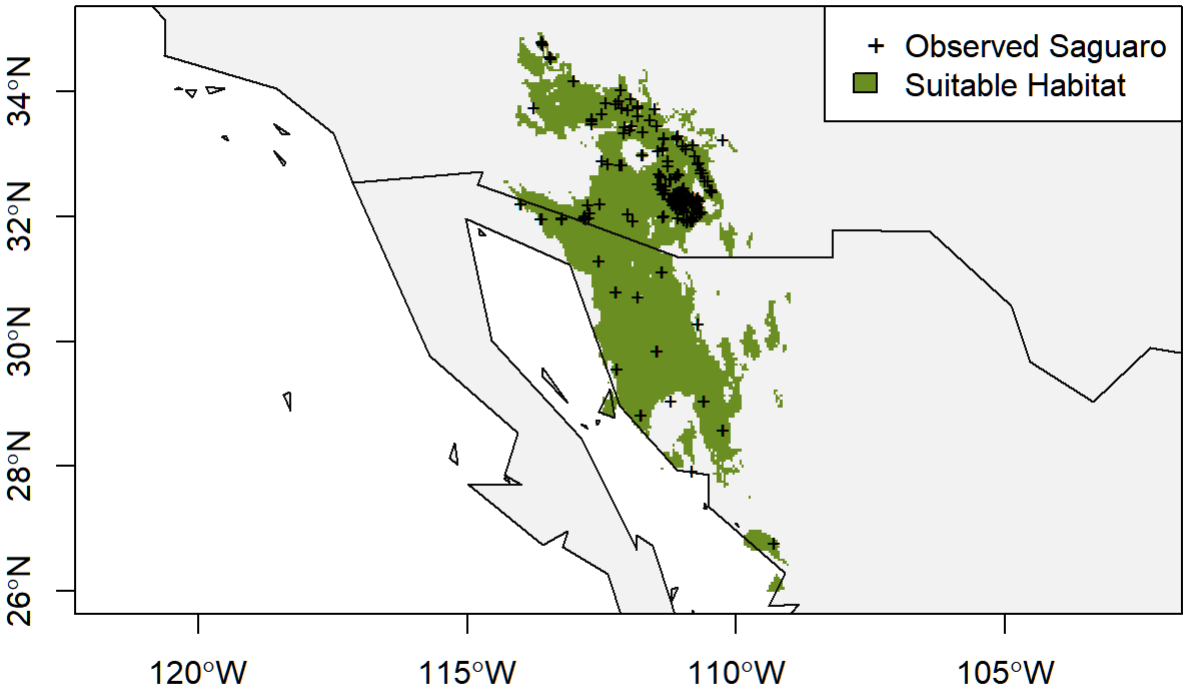

Figure 1: Known occurences of saguaro cacti and their suitable habitat estimated by the bioclim model

Table 1: The minimum occurence probability accepted for "presence" of saguaro

Minimum Threshold
0.003025

Discussion

The suitable habitat estimated from the bioclim model appears to be well represented by the known observed locations with saguaro cacti. However, as this distribution is highly dependent on the minimum occurence probability which defines whether the environmental conditions are similar enough to those where saguaro are known to grow, more information would be required to make this model robust. This could be achieved by incorporating data points where saguaro cacti were not observed (or absence data).