# Introduction

Extreme weather conditions and natural hazards are predicted to become more frequent as the climate warms. These storms seen in recent years leave widespread ecological damage in their wake, pushing species in hurricane zones toward extinction (Goncalves et al.). One proposed conservation strategy is translocation, moving a species considered at risk from a source population to a target population or habitat. Translocation has been shown to be successful when performed for conservation purposes, and several success stories have been reported including the restoration of snowy egret (*Egretta thula*) populations in Louisiana and Florida (Seddon & Armstrong, 2016) and have also served to enhance ecosystem processes such as in the case of wolf reintroductions to Yellowstone National Park (Smith & Peterson, 2001) . Recently in the United States, there has been renewed interest in translocation as a conservation strategy, and as a result the U.S. Fish and Wildlife Service (FWS) revised a section of the Endangered Species Act, allowing reintroduction of experimental populations outside their ‘historic range’ (Fish and Wildlife Service, 2022). Translocation is recognised as a risky strategy, due to the ecological and socioeconomic impact that the source species may have on the target area. As a result, risk assessment frameworks include an assessment of the suitability of the target location to the source population as an initial step to reduce the risk involved in translocation (Hoegh-Guldberg et al., 2008).

Species distribution models (SDMs) provide an evidence-based approach to predict the environmental suitability for a species to a given habitat (Guisan et al., 2013). We propose a tool that is trained on the species occurrence data provided by citizen scientists and uploaded to iNaturalist.org to learn to identify locations that have suitable environmental characteristics for relocation of an at-risk population. This model was developed specifically for species observed in Florida in the southeastern U.S. as a region with high hurricane risk and habitats of ecological interest that are at risk from extreme weather.

Pip Method:

The list of species was chosen from the given dataset from iNaturalist.org containing unique species IDs and decimal degrees coordinates. All species with occurrence data between the Florida state boundary coordinates were selected as target species, resulting in a list of 36 species including 24 birds, 5 reptiles, 4 mammals and 3 amphibians.

All coordinates in the training data were mapped to Koeppen-Geiger habitat classifications (Beck et al., 2018) using Nearest Neighbours Classification (Cunningham & Delaney, 2022) with a single nearest neighbour to give an additional ecological feature to each given coordinate.

# Discussion

Pre-emptive criticism:

This model is limited by only evaluating ecological suitability of a target habitat and does not consider the economic cost, public opinion or other socioeconomic factors that should be assessed when planning relocation. The model should be used alongside expert opinion and regional and national conservation guidelines.

The model is working with public data which is liable to be incomplete, inconsistent and noisy, as not every occurrence of a species will be recorded, and threatened species may suffer from very few datapoints. Crucially the dataset is made up of occurrence data, and does not include absence data, which would strengthen the model’s predictions by identifying strictly unsuitable habitats as well as potential target sites. Zbinden et al., 2024 proposed a strategy of loss-function modification to integrate pseudo-absences in multi-species models. This may be included into this model to address class imbalance and pseudo-absence data.