## Potential Artificial Cavity Nest Site Locations: Puerto Rican Parrot (*Amazona vittata*) Captive Breeding Release Program

By: Kristen Burgess, Julia Taranto, & Emma Trockey

## Abstract

The once abundant species, the Puerto Rican Parrot, has dwindled in numbers almost to extinction. Currently on the endangered species list these beautiful birds need help raising their population in order to survive. For this project we have researched and download information about these parrots to create criteria that would find them ideal artificial nesting sites. The criterion includes their current geographical preferences, food and shelter resources and anthropogenic features. We identified 45 final nesting sites that fulfilled all the requirements within the El Yunque National Forest. This projected has resulted in the use of geospatial analysis as a tool that could eliminate the Puerto Rican Parrot from the endangered species list and help them to flourish again as a species in the wild.

## Introduction

The Puerto Rican parrot (*Amazona vittata*) is a federally endangered bird that is endemic to the island of Puerto Rico (USFWS 2010). The U.S. Fish and Wildlife's Puerto Rican Parrot Recovery Program is intended to conserve and protect captive and wild parrots. By releasing healthy captive bred birds into the wild, a larger stock of breeding pairs may encourage a more diverse genetic pools thus promoting healthier overall populations.



Figure 1. Locator map of El Yunque National Forest in regards to the island of Puerto Rico.

## Methods

To locate potential artificial nest sites for the release of Puerto Rican Parrots, we obtained GIS layer data from NOAA, the USDA Forest Service, and ESRI and performed a spatial analysis in ArcMap. The layers we used in ArcMap included a digital elevation map (DEM), the outline of Puerto Rico, all of the protected areas of Puerto Rico, and roads. Our process began by projecting all of our layers into "NAD\_1983\_StatePlane\_Puerto\_Rico\_Virgin\_Islands\_FIPS\_5200". Within our Protected Areas layer we selected by features "El Yunque National Forest" to single out and create a new layer with just the forest that the Puerto Rican Parrot inhibits (El\_Yunque\_NF). We then used the "aspect" and" extract by mask" tools on the DEM layer to select areas with west facing slopes and created a new layer to erase the excess aspect features that are not within El Yunque National Forest (Extract\_Aspect.img). "Raster calculator" was used to select areas within 500-700 meters, and with the new layer created (DEM\_selection.img), "raster calculator" was again used to create a layer with both aspect and elevation (Aspect\_Ele.img).

Next, we converted our new layer into a shapefile using the "raster to polygon" tool to continue our analysis of vector data (Aspect\_Ele). With our new shapefile consisting of polygons, we erased the empty space polygons leaving us with polygons that are facing the desired direction, in the desired elevation, and within the Puerto Rican parrot's range in El Yunque National Forest (Candidate\_Sites1).

We created a 200 meter buffer from our roads layer using the "buffer" tool and then used "erase" to erase the sites that fall within 200 meters of all roads (Buffer\_200). Lastly, we "selected by attributes" polygons with an area  $\geq 25,000$  meters and were left with a layer with all of our desired parameters leaving us with our final candidates. A detailed flowchart is provided below to get a better understanding of the tasks performed in this project.



Figure 2. Flow chart of the steps used in ArcMap to perform the spatial analysis for selecting suitable artificial nesting sites.

Results

The final map showed that artificial nesting sites for the Puerto Rican Parrot would be best placed in the 45 parcels of land we have selected based on the parameters we set. These parameters selected areas that had the ideal elevation, slope, distance from roads, parcel sizes greater or equal to 25000 square meters and that are within the El Yunque National Forest protected area in Puerto Rico.



Figure 3: This map presents the 45 final nesting sites for the Puerto Rican Parrots in the El Yunque National Forest.

Discussion/Conclusion

Geospatial Analysis has helped us find the ideal nesting spots for these parrots that will meet their needs, protect and hopefully give them the chance to rebuild their population and finally no longer be an endangered species. In the future more studies could be conducted and new parameters developed to learn more about the Puerto Rican Parrots and their environment in order to see them once again flourish in Puerto Rico. Hopefully what we have learned from this project can and will be applied to any and all other species on the endangered and threatened species lists to preserve and protect our wildlife and their environments.

Literature Cited

U.S. Fish & Wildlife, 2010. "Puerto Rican Parrot", https://www.fws.gov/southeast/prparrot/

White, T. H. Jr, G. G. Brown, J. A. Collazo, 2006. "Artificial cavities and nest site selection by Puerto Rican parrots: a multiscale assessment". Avian Conservation and Ecology.

William J. Ripple, David H. Johnson, K. T. Hershey and E. Charles Meslow (Apr., 1991), "Old-Growth and Mature Forests Near Spotted Owl Nests in Western Oregon" The Journal of Wildlife Management Vol. 55, No. 2, pp. 316-318, http://www.jstor.org/stable/3809156?seq=1#page\_scan\_tab\_contents.

Acknowledgements Humboldt State University Professor David Gwenzi

Data.gov, 2013. "TIGER/Line Shapefile, 2013, state, Puerto Rico, Primary and Secondary Roads State-based Shapefile", <u>https://catalog.data.gov/dataset/tiger-line-shapefile-2013-state-puerto-rico-primary-and-secondary-r</u> <u>oads-state-based-shapefile</u>.

United States Department of Agriculture Forest Service. (2000), "Caribbean Island Land Cover" http://data.fs.usda.gov/geodata/rastergateway/caribbean/index.php