

The Puerto Rican Parrot Recovery Project's Challenges and Methods of Introducing a Wild Population of Parrots to Protected Rainforest Lands.

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The Puerto Rican parrot is the only parrot endemic to the island of Puerto Rico. The parrot was named the Iguaca by the Tainos, the indigenous people of Puerto Rico. The species has been listed as critically endangered since 1994, although their population has been in decline for centuries since the colonization of the island. Only 3 Puerto Rican parrots were reported in the wild after hurricane Maria in 2018. The near extinction of the Puerto Rican Parrot is mainly due to habitat loss caused by the deforestation of the island by colonists to create agricultural land. The historical changes in land use of the island Puerto Rico has irreparably changed the ecology of the island causing much of the island to become uninhabitable to the Puerto Rican parrot. Official conservation efforts did not start until 1968 when it was reported that only 24 Puerto Rican parrots were left in the wild and the Puerto Rican Parrot Recovery Plan was created. The Puerto Rican Parrot Recovery Plan is a collaborative program between US Fisheries and Wildlife Service, The US Forest Service, and The Department of Natural Resources of Puerto Rico with the goal to breed, release and reintegrate the Puerto Rican Parrot into protected rainforest land. The program has been successful in raising the total population numbers of the Puerto Rican parrot but hurricane Maria and previous hurricanes have limited their progress establishing a wild population. Myself and other Oregon State University students were given the opportunity to volunteer for the USFWS at the Puerto Rican parrot soft release site near the town of Maricao, in the Maricao state forest.



Figure 1: Satellite Bird at the Maricao Aviary

Description and Behavior of Puerto Rican Parrot

The taxonomic name for the Puerto Rican parrot is *Amazona vittata*. The genus *Amazona* encompasses 30 different species of herbivorous green parrots in South and Central America. The adult Puerto Rican parrot typically is about 28-30 cm long and weighs around 10 ounces making it one of the smallest species in its genus. You can distinguish it from other species in the genus *Amazona* by its size and its unique coloring. Puerto Rican parrots have a circle of white feathers around their eyes, a strip of red feather above their beak and their feathers have blue tips. The Puerto Rican parrot does not exhibit sexual dimorphism so both sexes are the same size and color. They can inhabit the lower tree canopy of tropical rainforest, flying from tree branch to tree branch as they are not known for flying long distances. They originally inhabited much of the coastal forest of Puerto Rico before it was deforested. They are social birds so they often live and nest in the same area as other members of the species. They rely on the sound of other parrots to navigate back to the flock and are able to communicate with each other about their environment like calling others to a food source or alerting the flock to a predator.

Adult parrots pair up and mate for life, paired up adult parrots will often stay close to each other most of the time. The Puerto Rican parrot does not build its own nest out in the open on a tree branch like other bird species. Instead they choose to nest within the cavities in the trunk or limbs in large endemic trees such as the endangered Palo Colorado tree. Breeding occurs in the dry season for Puerto Rico from February through June.

After breeding the female will lay 3 or 4 eggs and incubate them inside the cavity nest for 26 days while the male searches for food to regurgitate to feed the female while she is brooding. After the eggs hatch both parents will leave the nest in search of food to regurgitate to the chicks. The chicks will grow for 60 days inside the nest, relying on their parents to bring them food. Fledgling will start to emerge from the nest for short periods of time about 60 days after they first hatch. The young parrots will stay close to the nest and rely on its parents for food and guidance about where to find food until the next breeding season or until it finds a mate.

Their diet in the wild consists of fruit and vegetation from their habitat, some of their native food sources include the fruits from the Tabonuco tree (*Dacryodes excelsa*), Sierra palm (*Prestoea montana*), the royal palm *Roystonea borinquena* and *Cupeillo trees* *Clusia clusoides*.

Causes of Population Decline

Habitat loss is the driving reason behind the near extinction of the Puerto Rican parrot. The species has adapted to survive with a habitat of the endemic trees and plants of Puerto Rico. It is estimated that the Puerto Rican parrot population had about a million individuals before colonization of the island. Their population declined as the rainforest was cut down to create agricultural land under Spanish control. The Luquillo mountain forest was deforested for timber production.

Old growth trees including many Palo Colorado trees were burned to provide charcoal for the first and second world war. The colonization of Puerto Rico not only harmed the parrots' habitat but birds themselves as well. Puerto Rican Parrots were hunted to prevent them from damaging crops and young chicks were sold into the pet trade. Direct violence and intervention from humans was also a contributing factor to the decline of the Puerto Rican parrot population. They also faced predation and competition for resources from invasive species introduced to the island such as other parrot species, red tail hawks and red tail boas.

The problem that conservationists are faced with when releasing raised Puerto Rican parrots is that the Puerto Rican parrot is no longer adapted to the environment they are being released into. It was estimated that only around 1% of Puerto Rico's rainforest was left untouched.

The environmental damage caused by the mass deforestation left the ecology of the island forever changed. Multiple forest biologist and conservation specialist we got the privilege of speaking to in Puerto Rico discussed the challenge of replanting restoring the forest that were cut down over a hundred years ago being that there is no official record of the endemic plant species in the rainforest of Puerto Rico before deforestation began. It has been an uphill battle for forest conservationists in Puerto Rico to replicate the original ecology of the Puerto Rican rainforest in involving a lot of research in endangered endemic plant species and their growing conditions.

Many of the endemic flora species the Puerto Rican parrot depends on for food and shelter are not abundant enough in the restored rainforests to allow them to be released without assistance.

The prime example being correlation between the decline of the Puerto Rican parrot population and the removal of their main nesting tree, the Palo Colorado. The removal of the Palo Colorado tree severely disrupted the nesting habits of the Puerto Rican and led to a decline in their population since there is not enough natural nesting habitat to sustain their population. Conservationists working USFWS and DNR on the parrot recovery project have found methods to work around the ecological challenge the Puerto Rican parrot faces to assist with survival of released hatchery-raised parrots.



Figure 2: Illustration of a Palo Colorado Tree by Elbert L. Little



Figure 3: Parrots in the prerelease enclosure at Maricao Aviary



Figure 4: Artificial Puerto Rican Parrot Nests.

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Efforts of Puerto Rican Parrot Recovery Project

The Puerto Rican Parrot Recovery Project has been successful in raising the population of Puerto Rican parrots in both the wild and in captivity since its beginning. Despite the setbacks caused by hurricanes as of March 2022 there are about 250 released wild parrots and 469 currently living in captivity across the project sites. The project operates out of three sites, a hatchery and release site located in the El Yunque national forest, a release aviary in the Rio Abajo state forest and a release area located at Department of natural resources fish hatchery in the Maricao State forest. The three sites are at the tips of a triangular area of protected state forest deemed suitable for the survival of the Puerto Rican parrot. The plan is to release parrots into the area from each site with the goal of establishing a permanent wild breeding population in the rainforest.

My fellow students and I got the opportunity to volunteer with the release site near Maricao. The Maricao aviary cares for both parrots they are preparing to release and parrots that are not able to be released due to old age or health issues. The birds that will not be released are called satellite birds and they are housed in enclosures surrounding the main release cage to help keep released birds in the area where food and nesting habitat is made available by the recovery project staff to help with their survival. Parrots that were being prepared for release were kept in a large aviary with each other and wore weighted collars to get the bird used to flying telemetry collars when they are released. Each parrot's behavior and health is observed during this time to determine if they are able to be released. Once parrots are selected for release, they are fitted with a radio telemetry collar with a unique combination of colored beads on the antenna to make the individual birds identifiable. They are placed into a new section of the aviary enclosure which is open to the outside to allow parrots to come and go from the enclosure as they please. Scientists provide food and water in trays up in the tree canopy and artificial nesting cavities for nesting habitat for the released parrots. This strategy of release is called soft release because the release parrots are expected to stay in the area and to get food and shelter from the aviary site if needed. This strategy is best for the conservation of the Puerto Rican parrot because it is not entirely adapted to the new ecology of the forest they are being reintroduced to.

While volunteering with USFWS we got the opportunity to work closely with these beautiful parrots and help with maintenance on the aviary site to make observation of released birds easier. We fed the parrots by refilling hanging feeding trays with a mixture of nutritional feed pellets, common fruits, vegetables and seeds as well as wild vegetation from the forest surrounding the aviary. We also cleaned inside the enclosures, took attendance of released birds in the area, and observed the Maricao site's first clutch of parrot fledglings start to emerge from one of the artificial nests. We also assisted in rebuilding a few of the observation trails to artificial nests that were washed out by hurricane Maria and dug out a blocked dam in the creek on the aviary site.

My Experience

Volunteering for the US Fisheries and Wildlife Service on Puerto Rican Parrot Recovery Project was an incredibly rewarding and life changing experience for me. The effort being put into saving the Puerto Rican parrot by conservationists gives me hope for the fate of other endangered species. It gave me an idea of all the work, dedication and planning that goes into caring for and protecting endangered species. Hearing about the deforestation of endemic trees in Puerto Rico caused the decline of the Puerto Rican parrot species reminded me of how fate of many species are tied to the condition of the ecosystem they inhabit. It is so important to protect unique ecosystems like Puerto Rican rainforest to prevent population decline of organisms with specific survival niches like the Puerto Rican parrot. The scientists working on Puerto Rican Parrot Recovery Project have had to find their way around many of the obstacles of raising and releasing the parrots back into an environment that has changed from what they have adapted too. Being able to participate in this work gave me a glimpse into the day to day job of a conservation scientist and the methods they use to release captive animals safely. The entire experience of my trip to Puerto Rico helped solidify for me that I want to continue studying the interaction between different organisms within the ecosystem. I want to contribute to preventing the loss of endemic species as the effects of climate change and human caused habitat damage continue to threaten them. I feel so fortunate to have been able to witness and work with the beautiful Puerto Rican parrot and I hope one day to see them in the wild.



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