Experimental releases of Hispaniolan parrots in the Dominican Republic: implications for Puerto Rican parrot recovery

Thomas White et al.

Introduction

Formerly abundant throughout Puerto Rico, the Puerto Rican parrot *Amazona vittata* is now considered one of the 10 most endangered birds in the world. Currently, there exists only one wild population of approximately 35–40 individuals in the Caribbean National Forest of eastern Puerto Rico. Two additional captive populations totaling around 105 birds are currently held in separate aviaries located in the Caribbean National Forest and the Rio Abajo Commonwealth Forest in north central Puerto Rico. The primary function of these captive populations is to provide a sustainable source of Puerto Rican parrots for release into the wild to bolster the current wild population, as well as for eventual re-establishment of a second wild population elsewhere in Puerto Rico (Snyder *et al.*, 1987). Releases of captive–reared Puerto Rican parrots to augment the wild population have long been recognized and recommended as a crucial step toward recovery of the species (U.S. Fish and Wildlife Service, 1982).

Captive-reared Puerto Rican parrots were previously released in the Caribbean National Forest in 1985. However, the small number (three individuals) released was insufficient to evaluate viability of the technique to achieve Puerto Rican parrot recovery goals. A similar release of 18 captive–reared Hispaniolan parrots *Amazona ventralis* was conducted in the Dominican Republic in 1982, but also was inconclusive because of logistical problems, short study duration (two months) and unstructured pre–release protocols (Snyder *et al.*, 1987 & Collazo *et al.*, 2000).

From 1997 to 1999, we released 49 captive–reared Hispaniolan parrots in Parque Nacional del Este, a 42,000 ha area of subtropical dry and moist forests located in southeastern Dominican Republic (Abreu & Guerrero, 1995). Each parrot was radio–transmittered and monitored for up to one year to determine survival, movements and habitat use. Our goal was to develop a release strategy for Puerto Rican parrots and gain insights about potential survival of released captive–reared Puerto Rican parrots. We used Hispaniolan parrots because they are the closest relatives of Puerto Rican parrots, are not critically endangered, and have been used successfully as surrogate parents for Puerto Rican parrots (Snyder *et al.,* 1987). Moreover, their use for experimental releases in the 1980's supports our contention that hispaniolan parrots are a suitable biological model from which to gain insights about Puerto Rican parrot post–release survival. The value of the hispaniolan parrots as a Puerto Rican parrot model was enhanced in this case because released parrots were reared in the same aviaries as Puerto Rican parrots destined for future releases in Puerto Rico. We believe that the intrinsic demographic and genetic value of captive Puerto Rican parrots for the recovery of the species precluded their use during the developmental phase of a release strategy. Finally, because Hispaniolan parrots are native to the Dominican Republic, the releases were conducted there in order to release parrots in historical occupied habitat, and to avoid exacerbating the problem of introduced exotic psittacines in Puerto Rico.

Here we present a general overview of the release project, including techniques and ideas that worked, as well as those which did not. Readers are referred to Collazo *et al.* (2000) for detailed descriptions of study area, experimental design and results of statistical analyses. As with most field projects, many problems we encountered were initially unforeseen, and some early ideas later proved impractical.

Problems were encountered during the initial planning phase, during which we intended to conduct multiple releases in four widely separate areas of the Park. Although this approach would have provided for spatial and temporal replication, practical limits of both personnel and equipment later rendered this impossible. Instead, we chose to focus efforts within an area of 5,000 ha encompassing the northwestern quadrant of the Park. However, by foregoing true spatial replication we later were able to more intensively monitor each released parrot, thereby gaining detailed data on individual survival, movements and behavioral interactions.

Release techniques

We released parrots from four separate release cages which also were used as on-site training and acclimation facilities. Measuring 3.6m long x 1.5m wide x 2.1m tall, each cage contained four parrots and provided space for flight. Cages were suspended approximately 2m above ground level. Parrots were acclimated on-site for a minimum of 40 days, during which they were exposed to a wide variety of locally occurring native foods. Use of cultivated agricultural products was avoided, as the objective was to accustom parrots only to those species they would later encounter within the study area and to minimize the possibility that they would become local crop depredators. Each parrot also was equipped with a “dummy” radio-collar of the same weight (11 g) and configuration as the actual radio-transmitter in order to accustom them to the device before release. Parrots also were subjected to an exercise program (e.g., forced flight) during the acclimation period in an effort to maintain or increase flight stamina and ability. Approximately 2–3 days prior to release, each parrot was subjected to a complete veterinary examination and functioning radiotransmitters were attached. On dates of releases, cages were opened before dawn and parrots allowed to exit at will.

Results of releases

Of the 24 parrots released during 1997, five died within five days of release (Collazo *et al.*, 2000). Five additional parrots died shortly after onset of the marked dry season (January–April) characteristic of eastern Caribbean dry forests. Two additional birds fell prey to a Red-tailed hawk(s) *Buteo jamaicensis*. In contrast, none of the 25 parrots released in 1998 died within five days of release. In fact, birds of the first 1998 release (29th June 1998) had already survived 10 weeks when Hurricane Georges hit Parque del Este on 22nd September 1998. Effects of this hurricane on subsequent parrot survival are detailed in Collazo *et al.*, (2000).

We report 2 modifications to pre–release training and conditioning protocols that may have contributed to inter-annual differences in early survival trajectories. During the 1997 releases, we felt that the parrots did not exhibit good flying skills. Thus, we subjected 1998 birds to a more rigorous exercise routine. Median keel scores (index of flight muscles) increased significantly (P=0.0002) (Collazo *et al.*, 2000) from 3.0 in 1997 to 3.5 in 1998. The second pre-release modification consisted of reducing blood samples collected 2-3 days prior to release in 1998 (i.e., 1 vs. 2 cc per bird in 1997) or not collecting a sample at all (random selection). Although parrots can replace 2 cc of blood within 3–7 days, it is possible that birds released in 1997 were weaker when released than birds in 1998.

Our work sheds light on the importance of timing of release. We found that survival rates measured over the dry season were higher for birds released in October than in December. A plausible explanation for these differences may be that birds released in October had a longer opportunity to exploit higher levels of food availability. Eastern Caribbean phenological data suggest that food availability in moist and dry forests is greater during late summer–fall (rainy season) than during winter–early spring (dry season) (Lugo & Frangi, 1993). Conversely, factors such as presence/absence of predators were deemed similar for both groups. Although further tests are necessary before definitive inferences are drawn from this “seasonal food hypothesis”, prudence dictates that releases take place within the widest possible food availability window.

Conclusion

These results have been incorporated into the pre-release training and acclimation of Puerto Rican parrots scheduled for release during the summer of 2000. For example, on–site acclimation cages in Puerto Rico have an internal volume twice that of cages used in the Dominican Republic. This allows additional flight space per bird and facilitates maintenance of flight ability and stamina prior to release. Birds will be subjected to forced flight training at least as often and intensive as during 1998 pre-release training in the Dominican Republic. Pre-release physical exams will be conducted 5–7 days prior to release (as opposed to 2–3 days) and blood samples collected will be limited to 1.0 cc per bird to avoid potentially weakening birds immediately prior to release. Finally, predator aversion training will be conducted using a live red–tailed hawk while birds are housed at the actual release site. We hope that these modifications and measures will further aid in reducing or eliminating early, post–release mortalities as demonstrated by the successful 1998 releases in the Dominican Republic.

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Contributed by ***Thomas H. White, Jr.****, Rio Grande Field Office, U.S. Fish and Wildlife Service, Rio Grande, Puerto Rico, E-mail:* dputado99@hotmail.com*;* ***Jaime A. Collazo****, NC Cooperative Research Unit, Biological Resources Division, North Carolina State University, Raleigh, N.C., USA;* ***Francisco J. Vilella****, MS Cooperative Research Unit, Biological Resources Division, Mississippi State University, Miss., USA and* ***Simon Guerrero****, Parque Zoologico Nacional, Arq. Manuel Valverde, Arroyo Hondo, Santo Domingo, Dominican Republic.*

Re-introduction of peregrines in the eastern United States: an evaluation

Tom Cade, Harrison Tordoff & John Barclay

Introduction and background.

The recovery of the peregrine falcon *Falco peregrinus* in North America to the point at which it could be de-listed as an endangered species in 1999 was one of the great conservation achievements of the 20th Century. It was accomplished by the cooperative efforts of dozens of non-governmental organizations, state, provincial, and federal agencies, and many hundreds of private citizens in Canada and the United States. In this paper we focus on the re-introduction of peregrines into the eastern United States, one part of the continental program to restore this species to its rightful place in nature.

Although always rare, the peregrine was rather widely distributed through the eastern third of the United States, east of 90° W long., prior to the widespread use of organochlorine pesticides beginning in the late 1940s. Peregrines bred in fairly substantial numbers from Maine south through the mountains of New England, the Adirondacks of New York, and the Appalachian system to northern Georgia and Alabama, as well as along major rivers, wherever suitable nesting cliffs occurred. They also nested on cliffs in the western Great Lakes region, as well as on river bluffs of the upper Mississippi and its tributaries. A scattered population nesting in tree cavities once occurred along the Ohio River and lower Mississippi River valleys down into the cypress swamps of western Tennessee and northern Louisiana, but these birds had largely disappeared by 1900 with the loss of the big riparian trees.

Hickey (1969) described a total of 275 known nesting locations in the USA east of the Rocky Mountains, and Berger *et al.* (in Hickey 1969) listed 205 sites in the greater Appalachian region, where Hickey thought there might actually be 350 or more falcon territories. In the upper Mississippi River valley and western Great Lakes region there were some 40 known eyries and an estimated population of c. 50 nesting pairs (Redig and Tordoff in Cade *et al.*, 1988). Thus, the total number of available nesting territories in the eastern third of the United States probably ranged between 400 and 450 locations, approximately 80-90% of which were occupied in any given year in a region of >3 million km^2.

In the late 1940s and early 1950s local field observers began to notice a decrease in the number of occupied falcon territories, and by 1964 not one nesting pair could be found in the entire region (Hickey, 1969). At the same time the species had become greatly reduced in number in the western United States. These unprecedented losses paralleled similar declines in peregrine numbers in Europe and soon came to be associated with both lethal and sublethal effects of organochlorine pesticides, particularly DDT (Hickey, 1969 & Cade *et al.*, 1988). Consequently, the U. S. Fish and Wildlife Service listed both the *tundrius* and *anatum* subspecies as "endangered" in 1970. The Service then developed four regional recovery plans for restoration of the peregrine falcon. The beginning objective of the Eastern Peregrine Falcon Recovery Plan was to re-establish a population equal to half of the estimated original population of 350 nesting pairs or to whatever number the current environment would support. It was later modified to specify 175 to 200 nesting pairs with a minimum of 20-25 pairs in each of five recovery