

5.0 SCARLET MACAW BREEDING AVIARIES AND GENETIC CONSIDERATIONS

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One of the possible interventions being considered for the future in Guatemala and especially in El Salvador (where the scarlet macaw has been extirpated) is captive breeding and release of scarlet macaws in one or more areas where the conservation situation has stabilized sufficiently to allow this to be considered. Visits were conducted to two Guatemalan facilities that might be used to breed scarlet macaws to produce juveniles for release. On Monday 10 March we visited Aviarios Mariana (AM), owned by Nini de Berger and located in the southwest part of Guatemala in Taxisco, Santa Rosa, not far from the border with El Salvador. On Tuesday March 11 we visited the ARCAS Rescue Center (ARCAS) in Flores, Petén, in the northern part of the country. Both facilities are either currently breeding macaws or have in the past and both have expressed an interest in breeding macaws for possible releases into the wild in the future.

Kari Schmidt of Columbia University is doing her PhD on scarlet macaw genetics under Dr. George Amato of the American Museum of Natural History. A description of her project is included as a workshop Appendix.

5.1 Aviarios Mariana

Aviarios Mariana (AM) is a large private collection of birds, including Amazon parrot species, toucans, and macaws (mostly scarlet macaws, but also military and blue-and-gold macaws) owned by Nini de Berger. The collection originated in 1983, with birds kept at Nini de Berger's residence. Aviarios Mariana was formally founded at the site of Auto Safari Chapin in 1988, under the management of Scott McKnight, formerly of the Houston Zoo. He conducted a tour of the facilities. He has 10 fulltime staff, with any needed veterinary care obtained from a veterinarian who works with the zoo in Guatemala City. Auto Safari Chapin is an animal park and reserve that is one of the popular attractions in the region. The park features a drive-through area with many species of African animals, a pedestrian area and a recreation area with restaurants and a swimming pool.

The founding birds were for the most part purchased as chicks by Doña de Berger or her associates in Petén, although a few individuals were brought over from the small collection at Auto Safari Chapin. The last wild caught scarlet macaws were accepted into the collection in 1991.

Shortly after opening the facility at Auto Safari Chapin, the population experienced a period of rapid growth. At that time there was no management plan to prioritize breeding, so those birds that readily reproduced were allowed to do so. In addition, because there were 12 breeding cages available, only 16 individual scarlet macaws (8 pairs) were used for breeding and the other breeding cages used for other macaw species. Nearly two thirds of the scarlet macaw population at the aviary is descended from three pairs. The surviving founders are nearing 20 years of age, and thus may be approaching the end of their reproductive lifespans.

In the early years of breeding, eggs were frequently pulled to encourage double clutching, with the first clutch of chicks being hand-reared. The first F1 chicks hatched in 1990. The first F2 chicks hatched in 1996. Many of the F1s were found to be poor parents, particularly hand-reared individuals, which may have been due to improper socialization as juveniles, since the importance of such socialization was not recognized at that time. Since 1995, most chicks have either been parent-reared or fostered by proven breeders. There is no distinct breeding season at Aviarios Mariana, as there is in the wild, but rather breeding occurs year round. Nest boxes were closed in 2002, due to lack of space to hold additional birds.

There are 219 scarlet macaws housed at AM, with confirmed records existing for 209 of them. Based on these data there are currently:

Founders: 54 (including all 16 founders used in breeding)

F1: 118 (all adults, no chicks)

F2: 37 (all adults, no chicks)

The macaws are housed in three different types of cages. The breeding cages are 3 m x 1.78 m x 1.9 m tall and suspended 1 m above ground (Figs. 5-1 and 5-2). Nonbreeding birds are housed as singles and duos in holding cages 2.5 m x 1.22 m x 1.22 m high suspended 1 m above ground (Fig 5-3). The aviary also has 5 flight cages for juvenile holding ranging from 5 m (3), 6.25 m (1) to 10 m (1) long by 2 m wide and 2.1 m high (Fig 5-4). Floors are concrete. The procedure was to move year old chicks to a flight cage with seven or eight other juveniles for three or four years. Bonded pairs were then removed and placed in general holding cages. Current thinking would suggest that the juveniles be allowed to mature in the presence of some well-adjusted adult birds, not only with other juveniles.



Figure 5-1. Breeding cages at Aviarios Mariana. Nest boxes are placed in the back in a covered barn.



Figure 5-2. Breeding cages and nest boxes at Aviarios Mariana. Nest boxes are made of conacaste wood and are 93 cm x 63 cm x 53 cm high. When opened for breeding, pine shavings changed as needed were used as nesting substrate.



Figure 5-3. Caging for nonbreeding macaws, kept one or two per cage. Concrete posts are used because wooden posts were found to rot too quickly.



Figure 5-4. One of five flights at Aviarios Mariana. The flights are large enough for housing groups of several breeders during the nonbreeding season and could be used for early socialization of fledglings destined for a release program, but are not large enough to be used as training flights for older fledglings prior to their being moved to a release site.

Current avicultural recommendations would be to flock the genetically compatible breeding and potential breeding birds during the nonbreeding season, with possible mate switching possibly occurring. Birds to be allowed to breed would be returned to breeding cages prior to the desired breeding period. Juveniles would be flocked in mixed age flights for several years and allowed to pick their own mates. Flocking in flights containing well adjusted adults is important for proper socialization of juveniles.

The diet is 90% corn/bean/dog kibble mix plus 10% mixed raw vegetables and seasonal fruits. Macaws receive 1/4 cup of sunflower seeds daily. Diet amounts tripled when parents were feeding chicks. The facility has a kitchen plus brooders and other facilities for hand rearing chicks if needed.

Kari Schmidt has conducted preliminary genetic analysis of mitochondrial haplotypes for 29 of the 54 surviving founders and 15 of 16 recruited founders. These data show that the majority of founders exhibited native haplotypes. However, two individuals were found to have non-local haplotypes that originated in Southern Central America or South America. Owner Nini de Berger recalls these two birds were imported from Panama.

One of these individuals was not a successful breeder, but the other was very prolific. Twenty four percent of the scarlet macaws at AM descended from this single macaw. Because this individual belongs to different genetic stock (“subspecies”) than Guatemalan and El Salvador

scarlet macaws, offspring from this bird are not considered suitable for release purposes in these countries. A breeding program for release into Guatemala or El Salvador would require that a systematic survey of the population be conducted to bar all of this bird's descendants from that breeding program.

Plans have begun to move the aviary to another site near the town of Escuintla, situated at a somewhat higher and cooler altitude. The new site is expected to be up and running by 2010. Only scarlet macaws with local haplotypes will be moved to the new aviary and serve as the stock to produce juveniles for release. While in the long term this may be good for the birds, the disturbance of the move may reduce any breeding, should the nest boxes be opened.

Recommendations: If a decision is made to have the aviary supply significant numbers of juveniles for release into the wild, it will probably be necessary to improve the recruitment rate, since only a small percentage of the founders have bred. More genetic diversity is desirable. Recommendations would include:

- Ideally, obtain consulting services of an avian veterinarian familiar with avicultural issues to give advice and assist in the following recommendations. Experience in breeding scarlet macaws or related species particularly valuable. Macaws are intelligent, social animals and successful breeding of desired birds has been found to often depend upon proper socialization and management techniques.
- Review husbandry procedures, records of individual macaws, and breeding records with the consulting veterinarian and define management goals for nonbreeding and breeding stock.
- Conduct full physical examinations, including recommended disease testing, as discussed in Chapter 8.0. Other testing would be decided upon as the result of clinical findings and management goals. (PCR and serological tests done on a relatively small subset of birds in previous years indicated no disease issues, and the aviary reported no history of disease problems)
- Endoscopic exams to look at state of reproductive organs to identify birds still able to breed or some of the offspring would be advisable if feasible.
- Select a genetically diverse subset of the potential breeding population for breeding to supply juveniles. As much of the Northern Central America genetic variability as possible should be reflected in birds selected for release.
- Breeding success is likely to be improved if breeding birds are flocked together in the nonbreeding season in one or more large flights and allowed to switch mates if desired.
- Juveniles would need to be flocked in one or more large flights with some older birds for a period after weaning in order to properly socialize them, either for future breeding or for conditioning for release purposes.
- Existing flights at the facility are not large enough to use as conditioning flights before sending to a release site. Another option would be to send medically screened young birds (not adults) for possible release to the ARCAS-Flores facility for socialization and conditioning in their large flights, along with suitable ARCAS birds, as well.
- For breeding for release, recommendations from a consulting avian veterinarian with Neotropical psittacine breeding flock experience should ideally be obtained to help design any new psittacine facilities that are built. While the facilities at the Autosafari Chapin site are very good, additional large flights are needed if birds are to be conditioned for release

into the wild. These additional facilities would include at least larger flights for flocking breeder birds with some nonbreeders in the nonbreeding season and larger flights for socializing young birds for release with mixed age groups of conspecifics and for physical conditioning.

5.2 ARCAS Rescue Center

The second aviary visited was the ARCAS Wild Animal Rescue and Rehabilitation Center. ARCAS is the abbreviation for Asociacion de Rescate y Conservacion de Vida Silvestre, a Guatemalan NGO founded in 1989. The Rescue Center is located in the Petén in the northern part of Guatemala, on the edge of the Maya Biosphere Reserve. The site is a 45 hectare wooded area of land on Lake Petén Itza next to the Peténcito Zoo, a 10 minute boat ride from the town of Flores, the capital of the Petén. Flores is also where the office of the Wildlife Conservation Society Guatemala is located. In addition to the rescue center, ARCAS has its main office and co-administers a cloud forest reserve in Guatemala City, and a sea turtle and mangrove conservation program on the Pacific coast. We toured their Rescue Center on Tuesday 11 March, and they hosted a day and a half of workshop meetings at their educational center on the same site on Tuesday and Wednesday. Their scarlet macaw breeding program is also on the grounds of the Rescue Center.

ARCAS works in close collaboration with the Guatemalan equivalent of the National Park Service, the National Council of Protected Areas (CONAP) by accepting locally confiscated animals for rehabilitation, observation and, ideally, release into the wild. They also conduct education of the general public on wildlife issues. Confiscated animals are quarantined and if possible rehabilitated and released. Not all individuals are deemed appropriate candidates for release and are thus kept for educational purposes. ARCAS cares for over 35 species across broad taxonomic groups, including (but not limited to) psittacines, felids, primates, crocodylians, turtles, and mustelids. During peak traffic periods, they may receive 20-80 animals per week; 80% of which are juvenile parrots. They have a fulltime veterinarian on staff and the rescue center director is also a veterinarian. They rely very heavily upon volunteer labor. Several times per year, ARCAS and CONAP coordinate animal releases in different parts of the Mayan Biosphere Reserve. These releases are usually of parrots (being the most commonly trafficked animal in Guatemala), but releases of other birds, reptiles and mammals are also carried out.

The ARCAS scarlet macaw population has been fairly stable over the past 8 years. Additional confiscated or donated scarlet macaws are continually added to the population, but these are sporadic and unpredictable events of one or a few birds per year. Many of the macaws are not suitable for breeding purposes having disabilities or having been long time pets and may require human intervention such as incubator hatching or hand-feeding. Records are available for acquisition dates, but it is sometimes not known how old adult birds are when they enter the Center. Four pairs have been breeding since 2004 and are beginning to show regular fledge success. This project has been supported by the Columbus and Cincinnati Zoos, and the US Fish and Wildlife Service.

ARCAS currently (mid 2008) has about 49 scarlet macaws, many of them confiscated from sources in the Petén. The composition is:

Founders: 37 (all adults)
F1: 12 (7 adults and 5 chicks)
F2: 0

The facilities at ARCAS consist of variations on two types of enclosures: general holding of non-breeding individuals of mixed ages in medium to large flights (Figs. 5-5 and 5-6), and smaller but still spacious breeding flights with nest boxes for breeding pairs (Figs.5-7 and 5-8). The enclosures are set in the natural dry forest that predominates at the Center, and when possible, live trees are left in the enclosures. Constant vigilance for human and non-human predators is necessary. The diet consists of mixed fruits, corn and black beans, supplemented with locally collected wild foods.

To date, no genetic analyses have been conducted on the ARCAS population. However, Kari Schmidt has collected samples from all adults and one chick. This genetic analysis should be reviewed before any release program is begun or other pairs are set up for breeding in order to achieve the greatest genetic diversity of birds to be released into the wild population. In addition, this review should eliminate from the breeding or release pool any birds not of Northern Guatemala haplotypes.

ARCAS plans on continuing to breed macaws and would like to increase the number of pairs set up for breeding in anticipation of the establishment of a macaw population reinforcement program to release individuals or flocks into the wild. Again, increasing recruitment among a genetically variable subset of the population would be needed for the center to provide significant numbers of juveniles for such a program. Most of the recommendations for Aviarios Mariana apply to the ARCAS center as well. As with AM, results of past PCR and serological tests reported no disease problems among the macaws, suggesting no particular disease issues, although some serological positives – almost certainly false positives- indicate additional testing would be needed before using their juveniles for release.

Recommendations:

- Ideally, obtain consulting services of an avian veterinarian familiar with avicultural issues to give advice and assist in the following recommendations. Experience in breeding scarlet macaws or related species would be particularly valuable.
- Review husbandry procedures, records of individual macaws, and breeding records with the consulting veterinarian and define management goals for nonbreeding and breeding stock.
- Genetic analyses on birds to be considered for breeding for release is highly recommended, with the goal of maximizing genetic diversity among the available Northern Guatemala haplotypes available.
- Conduct full physical examinations, including recommended disease testing. See section 8.0 for some recommendations. Other testing would be decided upon as the result of clinical findings.
- Consider endoscopic exams to look at state of reproductive organs to identify birds in good reproductive condition
- Consider flocking breeders and other genetically suitable breeding stock in the nonbreeding season in one or more large flights. Allow mate switching if desired.

- Composition of diet should be reviewed to see if modifications might help with health and breeding success (e.g., more fat and/or protein).
- Juveniles would need to be flocked in one or more large flights with some older birds for a period after weaning in order to properly socialize them. Existing large flights are large enough. Review socialization procedures with consulting veterinarian.



Figure 5-5. Views of one of several large flights housing mixed-age groups of scarlet macaws at ARCAS.



Figure 5-6 . ARCAS macaws on swinging perches that increase their activity levels.

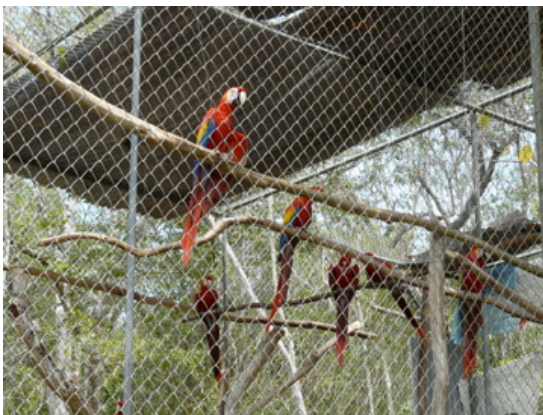




Figure 5-7. Two of the four scarlet macaw breeding enclosures at ARCAS. On the left is Fernando Martínez, Rescue Center Director, and on the right is Alejandro Morales, Rescue Center Veterinarian.

Figure 5-8 . Another view of one of the ARCAS breeding enclosures.

