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Green-winged
Macaw adult

The Green-winged Macaw *Ara chloroptera* occurs from east of Panama, through Colombia, Venezuela, Guyana and southern Brazil to Paraguay, Ecuador, Peru, Bolivia and northern Argentina. It inhabits evergreen forests, usually at altitudes of 500–1500m, but can also be found in deciduous tropical forest, savannah and scrub.



Green-winged Macaw breeding pair

Green-winged Macaws

CAPTIVE BREEDING SUCCESS IN FREEPOWER AVIARY, BRAZIL

BREEDING IN THE WILD

There are records of wild Green-winged Macaws breeding in January in Brazil. Each clutch comprises usually 2–3 eggs, and in a study of 16 nests in which 25 chicks were born, only 40% survived. Another 36% died from malnutrition and 24% were killed by predators. Those birds which do make it to adulthood measure 90–95cm in length and weigh 1050–1708g (Hoyo, 1997).

The Green-winged Macaw is not considered endangered, despite already being extinct in many Brazilian states, including Bahia, Espirito Santo, Rio de Janeiro and Minas Gerais Atlantic Forest—where it has been extinct for 70 years (Silviera, 2015).

Eduardo Nycander (Abramson, 1995) conducted a fascinating *in-situ* study of these birds, which showed the weight gain of chicks reared by parents in south-eastern Peru. From 23.9g at birth, they reached a mean peak of 1400g at 70 days old. Weight measurements were taken until the chicks were 99 days old, when they still had weight loss due to weaning and their weight was recorded at on average 860g. Weight loss during weaning reached 34.5%. The study also found that 32% of the eggs hatched and, in most cases, the third egg of the clutch did not hatch. The authors believed this was probably due to improper incubation after caring for the first two chicks. In another table, Nycander showed the results of monitoring 13 breeding pairs from which 25 chicks were born, but only 10 were weaned, giving an average of 0.7 chicks per nest.

IN CAPTIVITY

In captivity, commercial breeders, FreePower, in Rio de Janeiro, Brazil,

monitored the reproduction of two Green-winged Macaw pairs. By the end of the study, the males were at least 20 and females at least 15 years old. After two years of the initial pairing, they began nesting and one year later, chicks arrived.

The pairs were housed in suspended cages measuring 1.5m wide x 2m long x 1.5m high and suspended 1.2m from the ground. Nests were rectangular and constructed of wood, measuring 0.8m long x 0.4m wide x 0.5m tall.

Adult reproductive diet comprised 70% pellets and 30% grain mix, plus fruits and vegetables. During breeding, fresh corn was always added, which proved advantageous to the parent-raised offspring in early life.

The feed used has basic assurance levels of about 17–20% protein, 8–12% fat and 1–2.5% calcium. These levels were reduced outside the breeding season. Of the 26 chicks monitored and handfed, only two died, and this was due to electrical problems that affected the temperature in the intensive care machine.

In an effort to deduce the peak time for reproduction, we added the records of six young reared in previous years, making a total of 32 chick development records. All were born between July and February, but the peak was in October, when 34% of births occurred. This was followed by August and September with 13% of births each.

Most of the chicks spent up to 10 days being reared by their parents, but 40% of them were handreared from birth.

The handrearing methodology used was the same as published by Weinzettl (2015), but in summary we offered the



Green-winged Macaw chicks at 2–7 days old



Chicks at 21, 25 and 28 days

chick formula 12 hours a day, with 12 hours of rest. They were given 10–12% of their weight by formula at each feeding. Feeding often starts at 10 times a day on the first day of life, and reduces gradually until weaning. The temperature at which the chick is housed begins at 37.2°C on the first day and is gradually reduced during development to room temperature at the beginning of the weaning process.

The best weight gain for handfed chicks is achieved using commercial formula with levels around 35% protein and 19% fat during the first 10 days of life, and 20–22% protein and 15–20% fat from 10 days old. However, due to difficulties in acquiring the first formula in Brazil, most of the chicks were fed the second version from birth.

As shown in the table opposite, the average weight of chicks at birth was 22.3g. They reached on average 1309g at 70 days of life, when weaning began. Weight loss during weaning was around 20.4%, while the minimum peak reached was 1042g at 104 days, remaining stable at 120 days when they reached an average of 1130g at weaning.

In the same table, we can see the comparative development of our captive chicks with the data collected by Nycander (Abramson, 1995) in the wild. Because our aim was to wean the largest possible number of *ex-situ* chicks, the management of eggs and hatchlings was intense. We used artificial incubation, adoptive pairs, and handfeeding (either from birth or within a few days of life). In this way we were able to raise 11 chicks from a single pair in a reproductive year.

ANALYSIS AND CONCLUSION

Analysing the results, we can conclude that in Brazil the reproductive peak for Green-winged Macaws occurs in the spring and that the *ex-situ* management employed can provide a considerable increase in productivity of the species.

In nature only 40% of the chicks weaned, but in captivity that number was 92%. Nycander's research suggested that the third eggs were often not incubated properly, but our captive management processes eliminated that problem.

Weight gain recorded *in-situ* proved to



Green-winged Macaws at 45 and 54 days old

be a little more in the early development of the young, but this difference was cancelled out in captivity during weaning. In both situations the peak weight occurred at 70 days old and minimums at 99 days for *in-situ* and 104 days for *ex-situ*. Chicks lost less weight in captivity during weaning than those in the wild.

Average weight loss *in-situ* during weaning reached 34.5% compared to 20.4% *ex-situ*, indicating less stress at weaning for chicks in captivity.

That meant the comparative weight gain

between the two environments proved to be quite similar, which leads us to conclude that the commercial formula used met the desired objectives. If the more appropriate formula had been available for the first 10 days of the chicks' lives, the results could have been even better.

This comparison of studies allows us to see that *ex-situ* breeding methodology is increasing the population and consequently the genetic diversity in this species, which is particularly important given that it is already extinct in some regions of Brazil.

COMPARATIVE TABLE *IN-SITU* AND *EX-SITU*

	<i>IN-SITU</i>	<i>EX-SITU</i>
Reproductive peak	Summer	Spring
Eggs per clutch	2–3	2–6
Weaning of the third chick	0%	100%
Initial weight (average)	23.9g	22.3g
Weight at 99 days (average)	860g	1104g
Weight of weaned chick	-	1130g
Weight loss at weaning	34.5%	20.4%
Third-laid chicks weaned	0.7	2.6
Maximum chicks reared per pair	2	11
Percentage of infants weaned	40%	92%

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For more information on the work that Marcia is undertaking at FreePower Aviary in Brazil see www.marciaweinzettl.com.br.



58 days old—note the plumage quality



120 days old