9.0 SCARLET MACAW *IN SITU* MANAGEMENT

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9.1 Overview

Thursday and Friday, 12-13 March 2008, workshop participants visited the scarlet macaw nesting area location known as El Perú, where WCS-Guatemala has a permanent field station (See figure in Chapter 6 for location). During the January – August breeding season, field personnel locate nests and monitor scarlet macaw breeding success in the area. Nearby is an ongoing archaeological excavation of an important ancient Maya site known as El Perú-Waka', with a resulting frequent nearby presence of Guatemalan Army guards. As discussed in Chapter 6, El Perú was agreed upon as a good test site for first implementation of macaw conservation interventions in the MBR.

Participants drove from Flores to the village of Paso Caballos located inside Laguna del Tigre National Park and boarded a small boat to motor about 5 km down the San Pedro river (Fig 9-1). After a brief visit to Las Guacamayas Biological Field Station and a bit of birding (Fig. 9-2), the group continued several more kilometers to a landing from which a dirt road led to the WCS field camp.

Figure 9-1. The workshop participants traveled from the village of Paso Caballos several kilometers down the San Pedro river, visiting Las Guacamayas Biological Station and putting in at a landing about a 1 km walk from the WCS permanent field camp.

Figure 9-2. Scenes from the short visit to the Las Guacamayas Biological Field Station – a great base for research or for birding and visiting the archaeological site.

Thursday evening we heard presentations by WCS field personnel on their environmental education program (Fig. 9-3) followed by a presentation on nest monitoring, the anti-poaching program, and other field activities (Fig. 9-4). An education program run by WCS in several local communities involves school children in the nest monitoring work and this program has been successful in encouraging community protection of nest sites that "belong" to the children. Later in the evening Don Brightsmith facilitated a discussion in English and Spanish on possible *in situ* interventions that could be implemented to increase the number of chicks fledging from the monitored nests in the area.

Figure 9-3. WCS field staff and Merlinda, one of the volunteers (green shirt).

Figure 9-4. Presentation on the WCS environmental education program.

Friday morning we visited several scarlet macaw nests, including one containing three chicks (Fig. 9-5). After a visit to the archaeological dig at El Peru-Waka', we climbed an unexcavated Maya pyramid and a tower on top of that to get a view of the whole surrounding area (Fig 9-6). Several participants suggested the tower could be used for regular macaw or other bird counts. Counts from towers have been used elsewhere with psittacines to obtain estimates of temporal population variations, and this might be a way to get a better understanding of the migration of the scarlet macaws into and out of the El Perú area. Population structure has also been assessed using group size counts since many parrot species -- including *A. macao* – travel in discernable family groups. Upon return to the field facility, the group departed for the several hour drive back to Flores.

Figure 9-5. Nest visited at el Perú, containing three chicks. The parent exited and flew away as we approached. Note the eggshells to the left and up from the two chicks. Usually only one or two chicks successfully fledge from a nest even if more hatch. .

Figure 9-6. Observation tower near El Perú from which point counts might be made to assess population age structure (singles, pairs without fledglings, pairs with fledglings) and changes in numbers and population structure over time. On right, view from the tower.

9.2 Observations from Tambopata Macaw Project

Following the environmental education presentation Thursday evening, Don Brightsmith opened the discussion of *in situ* management options that might increase scarlet macaw breeding success by describing some of his work during 9 years as lead on the Tambopata Macaw Project at the Tambopata Research Center (TRC) in Peru. Among the themes of his research has been developing and evaluating techniques for increasing reproductive output of wild macaws and expanding knowledge of macaw nesting behavior. Since 1999, he and his assistants have studied 15-30 large macaw (*A. macao*, *A. chloroptera*, and *A. ararauna*) nests each year, climbing each nest generally every day or two from incubation through fledging. After hatching, chicks are periodically weighed, measured, and photographed and survival recorded. While such nest inspections are considered benign by macaw researchers, one of his findings was that when scarlet macaw nests were inspected during incubation, 33% of the eggs hatched. But when they refrained from climbing during incubation, 53% of the eggs hatched.

Both in the wild and in captivity, scarlet macaws typically lay three to four eggs during a nesting attempt. Unless a clutch is lost, they nest only once in a breeding season. Of 96 scarlet macaw chicks studied at TRC, 4% were predated, 6% died when the nest was taken over by other macaws, 27% starved, 52% fledged, and other things happened to 10%. Most of the birds that sucessfully fledged were first chicks. In total 25% of second chicks died of apparent starvation and 100% of third and fourth chicks died.. Chicks at TRC fledge around 86-93 days. In El Perú chicks fledge around 90-100 days, while at ARCAS the range seems to be about 75-80 days. Weighing and measuring chicks from El Perú nests so as to allow a comparison of growth curves between TRC and Guatemala might be worth considering if personnel are available. Don Brightsmith offered to supply written protocols, training, or ideally personnel trained on his project in Tambopata.

Don also described his research on supplemental feeding of chicks in wild nests at TRC. When chicks less than 15 days of age were noted to be falling behind the standard growth curve, his personnel were able to successfully save starving second chicks by climbing a nest once or twice daily for several days to feed them (using a commercial US macaw hand feeding diet (Harrison's). They fed the chick until the crop was full or the chick stopped eating. They did not need to feed more than 1 week and sometimes only 1 or 2 times before the parents would resume feeding the second chick adequately. However, the same technique did not work on starving third chicks. Two feedings per day allowed third chicks to maintain weight for about 5 days but not to gain weight, and the parents did not begin feeding the chicks. The third chicks typically died after a week or so. Preliminary analysis of nest videos from Tambopata suggests that parents were rejecting the third chick, by separating it from the group and ignoring it. There is some circumstantial evidence that one of the chicks may have even been attacked and killed by the adult. (However, see Fig. 9-7 for an example of a Guatemalan wild nest at the La Corona site north of El Perú that actually fledged 3 chicks).

9.3 Observations from Aviculture

Darrel Styles commented on some relevant avicultural observations with scarlet macaw chicks:

- Chick growth rates are logarithmic, so the longer the time between eggs laid or the longer a chick does not grow properly, the greater the disadvantage for that chick. Two days difference in age or developmental stage is about as great as is usually consistent with survival. This is also consistent with information from Tambopata. Illustrating this are the three chicks in Fig. 9-7 that are quite close in development.
- When chicks are hand reared, rearing has been found to be more successful when chicks of the same age, rather than different ages, are grouped together.
- In captivity where food should be adequate, scarlet macaws, nevertheless, usually successfully feed only two chicks.
- Chick weight peaks around 60 days in the wild. However, data from captive situations show that weight may peak as early as 55 days (from Abramson et al. 1995 book, The Large Macaws).
- Chicks can be fed in the nest with little problem until their eyes open. The experience in captivity is that if they are removed from the nest after their eyes are open (around 18 - 21 days), they are hard to feed. They apparently do not recognize the hand feeder as a food source. Applying this information to feeding chicks over 18 days of age in the nest suggests they may not readily take to supplemental feeding, or that if chicks are pulled and returned to the nest after their eyes are open, they may not recognize the parents as a food source (a comment also made by Dr. Thomas White of the Puerto Rican Parrot Recovery Project)..

Figure 9-7. While parent scarlet macaws generally appear to be willing to feed only one or two chicks to fledging, there are exceptions, presumably in situations where food is abundant. These three chicks successfully fledged from a nest at La Corona (north of El Perú) in 2008. Note the chicks are close to one another in development. A chick significantly younger than its siblings rarely survives.

9.4 Possible *In Situ* Management Techniques

With this background, discussions followed on possible interventions to increase the number of chicks successfully fledged from nests in El Perú and then in other sites in the MBR.

Supplemental feeding of chicks in the nest: Based upon experience at TRC, frequent monitoring of nests and then once to twice daily feeding of second or possibly third chicks with commercial macaw hand feeding formula for a few days to a week might increase the numbers of chicks that survive to fledging. However, this is a very labor intensive intervention, and as such is a major disadvantage with present WCS field staffing levels. Climbing and checking nests is time consuming and requires special equipment and training. Before attempting this intervention an analysis is needed to weigh the additional work needed to identify and save second or third chicks versus the additional number of chicks that would be likely to be saved. That is not to say it might not be a viable intervention, particularly if more personnel are available. This method may also be valuable elsewhere, with scarlet macaws or another species of macaws
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Pulling, feeding, and replacing chicks: If chicks do not respond to supplemental feeding or if in-nest feeding is considered too labor intensive, a possible intervention is to remove the chicks from the nest, feed them for a period of time, and then replace them in the nest. Reportedly Igor Berkunsky of World Parrot Trust has used this technique with a nest of blue-throated macaws (*Ara glaucogularis*) in Bolivia and has found that by feeding a third chick for up to a week he was able to replace it to be successfully fledged by the parents. More details are needed on this work. Avicultural experience, however, suggests at least some parents might not accept the chick back once it was removed if it were old enough to have developed individual characteristics. In addition, as Darrel Styles related, avicultural experience indicates that chicks that have their eyes open do not transition easily from being parent-fed to being hand-fed by a human or vice versa. Very young Puerto Rican Parrot (*Amazona vittata*) chicks have been removed from a wild nest, hand fed (and treated for medical problems) and replaced successfully. If this intervention were considered, an experimental phase should precede any attempt to do this on a larger scale. In addition, providing proper housing conditions (e.g., sufficient warmth) and feeding frequencies, particularly for young chicks, would have to be arranged. Furthermore, an ARCAS participant remarked that a captive-hatched chick removed from the nest and fed smooth, easily digested handfeeding formula later died from crop impaction after being replaced in the nest and fed coarser chunks of adult diet by its parents. This suggests care may need to be taken when transitioning from a diet of one consistency to another, particularly from a smooth, easily digested diet to a coarser and less pre-processed one.

Rearing chicks for replacement at fledging: If the adults will not accept a chick back into the nest, one potential intervention would be to hand feed it and replace it just before fledging. Potentially, captive raised chicks ready to fledge could also be used. WCS field workers reported they did this with one orphaned chick and the wild pair did accept it and mentor it. Again, proper conditions for rearing removed chicks would have to be provided and techniques for getting a previously parent-fed chick to accept human feeding would need to be developed. Since a newly fledged youngster is completely dependent upon its parents for feeding for a period of time after fledging and then dependent upon them for instruction for an even longer time, an experimental phase to evaluate this intervention concept would need to be performed before it could be

deemed feasible, with field personnel around to rescue the fledgling if it were ignored by the adults. Since success might depend upon the proclivities of an individual pair, human intervention to rescue an ignored chick may be necessary each time this was attempted with a new pair of adults. If feasible, this intervention could be implemented with a chick unrelated to the adult pair.

Releasing juveniles at fledging at a wild nest: As opposed to releasing a fledgling at a nest fledging young, this technique, termed "precision release" by Dr Thomas White of the Puerto Rican Parrot Recovery Project, involves release of one or two juveniles aged one to several years at the site of a fledging nest. The released birds would be properly conditioned and the limited flight ability of the fledglings would allow the new birds an opportunity to become a part of a small family group. Either captive hatched or rescued wild chicks could be used. This technique is covered in Section 10 under population augmentation techniques.

Double-clutching: A clutch of eggs could be pulled to encourage females to re-lay, and the pulled clutch could be incubated and reared for release. Even quite young chicks could be removed. According to well-known, experienced aviculturist Rick Jordan, "when the hen is mature, usually a second clutch will be laid to replace a lost clutch of eggs or "young" chicks. But if the parents were tending to the young for, let's say more than 21 days, the hen's hormones will have changed and she will no longer be in breeding condition and will not lay another clutch. So, it is a matter of age, and even a little bit of genetics. We find that hens that lay multiple clutches produce daughters that do the same." Double clutching is a standard technique in captivity and has been used successfully *in situ* with other bird species, but it was felt to be possibly problematic because of the narrow time frames of opportunity and the frequency with which WCS field personnel are able to check nests, and because macaws also are more likely to abandon nest sites after failure. Eggs would have to be translocated within a day or so of laying and before significant incubation had occurred in order to preserve the viability of the embryo. In the case of removing chicks, all chicks would have to be removed at a time when the hen's hormone status would still cause her to relay.

Fostering chicks: Captive produced chicks could be fostered into wild nests that had failed or possessed only one chick, or third chicks from wild nests could be placed into single chick nests. The technique is used successfully by the Puerto Rican Parrot Recovery Project to increase the number of wild-fledged chicks, and it has been used with other bird species. There was some discussion about at what age adults would accept chicks into the nest, and at what ages captive produced chicks would accept feeding by parents. Avicultural experience suggests the transition from hand-feeding to parent-feeding is easier with young chicks whose eyes are not open, but using parent fed chicks would be advisable. Chicks with eyes open should have been parent-fed while in captivity; however, with Puerto Rican parrot chicks, once the chicks had developed individually distinguishable characteristics, there was a greater chance of rejection by the adults. Hence younger chicks would be preferable to older. Introduced chicks should be comparable in age/development to the existing chick to avoid issues in competition for feeding.

While fostering would be predicted to work a significant percentage of the time, particularly with younger chicks, a number of complicating factors would need to be weighed before implementing this intervention. First, timing would have to right: the introduced chick would

need to be comparable in age to any resident chick and would preferably be quite young. If a chick were to be introduced into a failed nest, it probably would need to be done immediately or infertile eggs removed around expected hatch date and replaced with a young chick or ready to hatch egg. Second, most macaw pairs would be unlikely to raise more than two chicks, so the number of additional chicks that could be introduced into the population would be limited. In addition, it was pointed out that the bacterial flora varies even from nest to nest and that chicks placed in a new environment might not have the proper immunity to thrive. It could also potentially promote spread of disease, although if the parent birds had been tested and certified disease free, this issue would not arise. This approach has been successful with an Amazon species, so it is an intervention that has some history of success with psittacines. Implementing this might be most valuable as a research effort to prove the concept in *Ara* species.

Fostering eggs: Captive-laid eggs could be placed in wild nests or translocated from one nest to another. However, moving eggs would need to be done within 48 hours of laying and before incubation or just as the chick is ready to hatch, since moving at any other time is likely to disrupt developing blood vessels and kill the embryo. Transported eggs need to be protected from shocks and kept warm. Aviculturists in the United States have transported eggs within hollowed out loaves of bread. Timing would be critical, as chicks need to be comparable in age (within 2 days) in order to compete successfully for feeding. Again, the value of the number of individuals added to the population would need to be weighed against the level of effort before considering this intervention unless it were conducted as an experiment to prove the concept in a wild *Ara* species.

LITERATURE CITED

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