Macaw and Clay Lick Studies at Tambopata Research Center, Peru

By Donald Brightsmith, Ph.D.
Duke University, Durham, North Carolina

In late 1989 a group of researchers including two young Peruvians Eduardo Nycander and Kurt Holle traveled up the Tambopata River in southeastern Peru and established the Tambopata Research Center. Their goal was to study and preserve the large macaws that were so incredibly abundant at the site. They chose this area because it is immediately adjacent to a 100 foot tall river edge cliff or "clay lick" were up to 1000 parrots and macaws gather daily to eat clays rich in sodium. Under Eduardo's leadership the researchers constructed the first nest boxes ever used by wild macaws, saved and released doomed macaw chicks, and carried on intensive studies of reproductive ecology of Scarlet, Green-winged and Blue-and-Gold Macaws (for more information see Nycander et al 1995). This work continued in earnest until 1993 when the funding for the research dried up and Eduardo and Kurt had to make a difficult decision: give up and go back to Lima or try to find a way to maintain the station and continue their work with the birds. Their decision was to use ecotourism to fund the station and with that they founded Rainforest Expeditions.

In the years since 1993 they discovered that building a successful ecotourism operation was more than a full time job. As a result the pace of the research slowed as the company became established in the international marketplace. By 1999 Rainforest Expeditions had opened a second lodge, Posada Amazonas, won a number of international awards, and become a leader in Peruvian ecotourism. At this point the company was ready to reinvest in the macaw and parrot research that had given birth to the entire operation. In November 1999 they hired me, Dr. Don Brightsmith a research associate at Duke University, to take over the macaw research.

Since 1999 I have been using Tambopata Research Center as a base for my studies of many aspects macaw and parrot natural history and management. Some of the topics under study include: Blue-and-gold Macaw nesting and habitat management, macaw and parrot diets, nest box use by large macaws, Scarlet Macaw chick growth and survival, seasonal fluctuations in macaw and parrot abundances, the role of nest temperature and humidity in Scarlet Macaw hatching success, nest attendance patterns of Scarlet Macaws, and supplemental feeding as a method to increase macaw productivity. I have also begun intensive studies on the clay lick adjacent to the research center. For the remainder of this article I would like to review why birds use licks and briefly discuss some of the new information that I have discovered during my work in Tambopata.

Photo by Tad Foringer

Green-winged Macaws at a Tambopata clay lick. The birds are viewed from a hidden blind.

Throughout the western Amazon Basin in the nations of Ecuador, Peru, and Bolivia parrots, pigeons and turkey-like birds called guans assemble daily along the banks of streams and rivers to eat clay. The birds are apparently very selective as they habitually come to certain small sections of cliff while leaving other nearby sections almost completely untouched. In their landmark work on clay licks James Gilardi and colleagues (Gilardi, et. al 1999) showed that the clays from these licks effectively reduce the damaging effects of the toxic chemicals found in the seeds that the birds eat. Work I have conducted along the lower Tambopata River shows that birds eat significantly more clay from riverbanks with higher concentrations of sodium. As a result it seems that both detoxification and sodium are driving parrots to eat clay.

Since February of 2000 my research team have collected data at the clay lick on over 900 days. Over 600 days worth of data have been entered in to the computer and are currently being analyzed. This data set has proven incredibly valuable for documenting how the use of the lick is affected by the weather and how it changes with the seasons. One of the most obvious things is that macaw and parrot use of the lick is greatly reduced by rain. In fact during most rainy mornings there are almost no birds that go to the

lick. Another obvious pattern is that many birds almost only use the lick in the early morning. For example Mealy Amazon, Severe Macaw, Red-bellied Macaw, Yellow-crowned Amazon, Blue-headed Pionus, and others use the lick almost exclusively between sunrise and about 7:30 A.M. Interestingly enough, if it rains in the early morning these species will not go to the lick later in the day even if it is warm and sunny. Why the birds don't make up for these lost opportunities is unknown. Looking at the data between days I also found that the birds don't make up for "lost opportunities." Earlier research had suggested that macaws went to the lick once every 2 – 3 days (Munn 1992). For this reason I expected that after a series of rainy days I would find nearly twice as many birds on the lick. But upon analysis of my data it became clear that extra birds did not come to nor did birds spend an extra long time on the lick to make up for the mornings lost to the rainy weather.

The question now is how can we interpret these new findings in light of what we know about why birds eat clay? If the clay protects the birds from dietary toxins they should need to eat clay daily, preferably before going out and feeding. As a result, it makes sense that they do not eat extra clay after missing a day. But in this case what happens on days when they can't get clay? Do they have to switch to food sources with lower toxicity and what effect would this have? Also why don't the birds go to the lick later in the day once the rain stops? If the birds are eating soil to get sodium, why don't they eat extra clay to make up for amount of sodium they missed the day before? These questions are difficult ones to answer, but I plan to use them to mold my future research efforts and work to increase our knowledge of clay licks and the role they play in parrot biology.

Using the 3 years worth of data I was able to see for the first time how the abundance of birds at the lick changes throughout the year. The data showed that there was a general "high season" of lick use that started in late August and ran until January and a "low season" from February – July. However, within this general pattern there were strong differences among the species: Blue-headed Pionus peaked strongly July – September; Orange-cheeked Parrot September – October; and the Scarlet, Green-winged and Blue-and-gold Macaws peaked in December and January. Upon producing these graphs I quickly realized that each of these species, along with most of the others on the lick, were peaking during the breeding season. As a result of the years of nest monitoring data for Scarlet Macaws, I have detailed information on the timing of nesting for this species.

Comparing the timing of nesting with the timing of peaks in clay lick use I found that large macaw lick use was increasing rapidly right at the time that the chicks were hatching. As a result it seems that the extra soil is not being used to help parents get in to nesting condition nor to help the hens produce eggs, but that it may be necessary to help the development of the chicks. Another interesting pattern that came from this analysis was that the peak in lick use by Scarlet Macaws begins to drop off about 1 month before the majority of the chicks fledge suggesting that as the chicks age, their need for clay may decrease. Once again the unexpected results from my data set leave me groping for explanations for the patterns I have discovered. Could it be that the chicks are super sensitive to dietary toxins and need a heavy dose of clay at each feeding? Is it that chicks need high quantities of sodium to maintain their high growth rates? Both of these explanations are very plausible but remain to be tested scientifically.

The new finding that lick use is greatest during breeding season opens up new avenues of research for the future, but this is hardly the "silver bullet" that will allow us to understand everything about clay lick use by parrots. Many species are very common at clay licks outside the breeding season and many presumably non-breeding individuals use the clay lick. Equally important for us to understand is why the same species in other areas (like Scarlet Macaws in Central America) never use clay licks.

My past 4 years of research have been very exciting ones. I have learned a great deal about clay licks and the birds that use them. Of course my research has generated many more questions than it has answered, but little by little we are improving our knowledge of why these magnificent birds gather along the Tambopata River every morning to eat the precious clay from its banks.

Literature Cited

Gilardi, J. D., S. S. Duffey, C. A. Munn, and L. A. Tell. 1999. Biochemical functions of geophagy in parrots: detoxification of dietary toxins and cytoprotective effects. Journal of Chemical Ecology 25:897-922.

Munn, C. A. 1992. Macaw biology and ecotourism, or when a bird in the bush is worth two in the hand. Pages 47-72 in S. R. Beissinger, and N. F. R. Snyder, editors. New World Parrots in Crisis. Smithsonian Institution Press, Washington.

Nycander, E., D. H. Blanco, K. M. Holle, A. d. Campo, C. A. Munn, J. I. Moscoso, and D. G. Ricalde. 1995. Manu and Tambopata: nesting success and techniques for increasing reproduction in wild macaws in southeastern Peru. Pages 423-443 in J. Abramson, B. L. Spear, and J. B. Thomsen, editors. The Large Macaws: Their Care, Breeding and Conservation. Raintree Publications, Ft. Bragg, CA.

For more information on clay licks see:

Brightsmith, D. J., The real dirt on parrot clay licks. Bird Talk Magazine, November 2003

Diamond, J., K. D. Bishop, and J. D. Gilardi. 1999. Geophagy in New Guinea birds. Ibis 141:181-193.

Diamond, J. M. 1999. Dirty eating for healthy living. Nature 400.

Or visit the Tambopata Macaw Project Web Page:

www.duke.edu/~djb4

If you would like to visit Tambopata Research Center please visit www.perunature.com or contact postmast@rainforest.com.pe. If you would like to take a special macaw lovers trip visit:

www.perunature.com/sip02.asp

(special interest tours section). ❖