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**Wildlife Trust Conservation Division, Ministry of Natural Resources/
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Field investigations of the Belize Scarlet Macaw (*ara macao cyanoptera*)

by Sharon Matola and Eligorio Sho

Wildlife Trust

INTRODUCTION

The purpose of this two week field investigation was primarily aimed at re-documenting the speculated local commuting route of the Belize Scarlet Macaw. Dr. Elizabeth Mallory was first to suggest that the scant Belize population uses the Raspaculo River valley as a principal breeding ground, while flying long distances to forage for various food resources in other parts of the Maya Mountains, particularly, the western reaches of the Cockscomb Basin (Mallory 1994).

In March 2000, the Wildlife Trust Scarlet Macaw Conservation team, Sharon Matola, Eligorio Sho, and Martin Meadows, recorded numbers of Scarlet Macaws within the Raspaculo River valley, and then climbed over the Maya Divide, at a location which Dr. Mallory theorized was the most probable commuting route for the birds as they sought food resources. Scarlet Macaws were both heard and seen crossing the Divide on March 21, 2000 (Mallory and Matola, in press), but further documentation of this natural history event is needed to fortify efforts aimed at providing the most sound conservation strategies for these rare parrots.

REVIEW OF THE STATUS OF THE SCARLET MACAW, ARA MACAO CYANOPTERA.

A short review of the status of the species underscores the need to obtain data on its ecology in order to provide a solid framework for its conservation.

1. Status and Regional Distribution of Ara macao

The Scarlet Macaw has been listed in the Convention on International Trade in Endangered Species (CITES) first in 1976 on Appendix II, upgraded in 1981 to Appendix I, and in 1985 to Appendix I, as threatened by extinction (CITES-listed Species Database: Fauna, 2000). In 1997, the European Union gave its fullest protection by listing it in its Annex A (Council Regulation (EC) No. 338/97).

2. The Northern Central American Scarlet Macaw, Ara macao cyanoptera
 The Scarlet Macaw in the Maya Forest of Belize, Guatemala and Mexico, the Northern Central American Scarlet Macaw, is believed to be a

distinctive subspecies, *A. macao cyanoptera* (Wiedenfeld 1994). It has blue tips on at least some yellow wing coverts and no green band and is larger than Scarlet Macaws found from central Nicaragua into South America. This probable subspecies status, coupled with the fact that as few as 2,000 individuals of this subspecies may remain (Wiedenfeld 1994), makes conserving this population a priority.

Fewer than 100 birds are believed to survive in Mexico, and most of these are found in the Marques de Comillas area of the Lacondon forest. A small population also persists in northwest Guatemala in the Laguna de Tigre region, although chicks from all known nests are poached (Santiago Billy in litt 1997). The Scarlet Macaw apparently no longer occurs on the Pacific slope in el Salvador or Honduras. In Nicaragua, there remains a small population at Volcan Cosiguina. On the Caribbean slope in Honduras, the species remains in low numbers (Snyder et al 2000).

In a recent letter Birdlife International, the organization which applies categories of protection to over 9,000 species of birds worldwide, the following was stated: "In the regional context, the subspecies *Ara macao cyanoptera* has been assessed as meeting the IUCN Red List criteria for "Endangered" status by several independent experts in the recently published Parrot Action Plan on the basis of declines believed to be in excess of 50% over three generations. It would seem that this subspecies has been virtually extirpated from Middle America with an expectation that in the next 10 years, remaining populations will probably disappear except for those in highly protected areas".

"I understand that *A. m. cyanoptera* numbers fewer than 200 birds in Belize, and is restricted to the southwest of the country. This populations would qualify for "Endangered" status on the basis of its very small population alone. Any threats to its breeding grounds which could result in future rapid declines (e.g. loss of suitable trees for breeding) would elevate its national "Red List" status to "Critically Endangered" (Stattersfield, 2001).

3. Distribution in Belize

At this time, the Scarlet Macaw is found only in the Chiquibul and the adjacent Cockscomb Basin on the other side of the Maya Mountain divide (Fig. 1). Historically, Russell (1964), reported "flocks of few to thirty frequent the uninhabited headwaters of many of the larger streams in the central part of Belize". He mentioned seeing it..."in the Mountain Pine Ridge, along the eastern Branch of the Belize river, near the Hummingbird Highway, and in the upper parts of South Stann Creek". Wood et al. (1986) stated that the species is found in the Chiquibul only, and this is probably including the area northwest of the main divide of the Maya Mountains and south of the Macal River, including the Raspaculo valley. This implies that the birds had by this time disappeared from the Hummingbird Highway and the Mountain Pine Ridge, mentioned by Russell. Kamstra (1987) reported the bird as a permanent resident in the Cockscomb Basin..

4. Current Estimates of Population size, *Ara macao cyanoptera* in Belize

Due to the remote habitat locations of the Scarlet Macaw, an accurate estimation of population size is difficult. Past estimations include Mallory (1994) suggesting that the population is between 30 and 60 birds, based upon her two years of work along the Raspaculo River valley. Renton (1998) subsequent to a field study focussed upon nesting regimes, estimated the population to stand at approximately 200 birds. Matola (1999), stated the Belize population to be less than 250. In the Wildlife Impact Assessment accomplished by the Natural History Museum as part of the Environmental Impact Assessment {WIA}, for the Macal River Upriver Storage Facility (MRUSF), the population estimate was stated to be between 60 and 100 individuals (Minty 2001).

From field data collected since 1999, including that from the Raspaculo River valley, the western Cockscomb Basin, Cuevas Research Station, Ceiba Grande River, as well as observations of foraging Scarlet Macaws both from the villages of Red Bank and San Pablo, Eligorio Sho and Sharon Matola believe at this time, that the population size in Belize numbers no more than 150 individuals. Taking into consideration that 50 breeding units is thought to be a minimum to ensure short-term stability of a population (Frankel and Soule 1981), and that estimations indicate 20% of the Belize population breeds, it appears critical that strict protection of both the breeding habitat and foraging areas of the Scarlet Macaw is required in order to sustain their remaining population.

OBJECTIVES

As previously stated, re-documentation of a local commuting route was the principal objective during this two week investigation. However, another important focus was to identify nest sites, both from previous years, which would be noted for their active or non-active status, and any new nest sites.

METHODS FOR SURVEY WORK

Entering the Upper Macal river from the Francellia road, GP 968646, Eligorio Sho and Sharon Matola, using inflatable kayaks for transport, set out for a two week field investigation. This included travelling west on the Upper Macal river to the confluence of the Raspaculo river, continuing southwards past the confluence of the Monkeytail Branch, and then eastwards to an unnamed tributary which meets the Upper Raspaculo river at GP 048560.

A base camp was established approximately three kilometers from the confluence of the Upper Macal river, GP 072552. From this point, a trail was cut towards the Maya Mountain divide over a period of three days, reaching GP 092542, approximately 1.5 meters from the base of the Maya Mountains, at approximately 600 meters (Fig. 2).

All nest sites, camps and trail locations were recorded on a Global Positioning System, GPS, Garmin 12 Channel.

All sightings and vocalizations of Scarlet Macaws were recorded (Fig 3).

From flight patterns and behavioral displays, nesting pairs were noted with confidence. Nesting pairs remain on a low-flying pattern and in the area where they have established a nest. A particular "low/guttural" vocalization is usually heard. Further signs of nesting are the marks visible on the upper mandible of the Scarlet Macaw, showing evidence of nest manipulation and excavation. This, combined with a worn or bent tail, suggesting nest-sitting, indicates that the pair is actively nesting.

Apart from nesting pairs, Scarlet Macaws were noted in higher flying patterns. We assumed this was a foraging strategy, the birds seeking food resources outside of the Raspaculo River valley itself. Of particular interest was the possible role which the unnamed river valley played in a local foraging strategy. Since this tributary led to the Maya Mountain Divide, and then connected to the river system on the eastern side of the Maya Mountains, leading to the Swazey River which Scarlet Macaws are assumed to follow to foraging grounds westward, including Sale Si Peude, and onwards to Red Bank and San Pablo, this area was a major focus of our observations and field investigations (Fig. 4).

RESULTS

Scarlet Macaws were observed daily, except when rains prevailed all day. The largest group numbered 14 individuals, sitting on a Quamwood tree, *Schizolobium parahybum*, near the unnamed tributary leading towards the Maya Mountains. The following shows the important role which this same tributary and its associated river valley play in the natural history of the Belize Scarlet Macaw:

[TABLE]

In our five days of time spent in this river valley, 13 events were recorded including high flyovers, indicating that this is a probable local migratory route, as well as an important area where foraging takes place. It appears that when food resources are absent in other areas of their known territory, this unnamed tributary plays an important role in providing some food resources for the Belize population of Scarlet Macaws.

NEST SITES

Five nest sites were noted as active. One is located along the Upper Macal River, the remaining four are along the Raspaculo River. Two of these were active in 2001. The other three were documented on this two week field investigation, and will be monitored during the remaining field season. All nests are located in the area which would be flooded by the proposed Macal River Upstream Storage Facility (MRUSF). As shown by the enclosed photographs, nests are usually located within close proximity to the river and associated floodplain vegetation.

FOOD RESOURCES

Scarlet Macaws are principally seed eating birds, and their preferred seeds are those from the Quamwood tree, *Schizolobium parahybum* (Renton 1998). Along the Upper Macal and Raspaculo River valley during this

two week investigation, we noted very little seeds available on this floodplain species. However, Greg Sho, who often works in the Sale Si Puede region of the western Cockscomb Basin, states that Quamwood has more seeds in that area at this time. Coinciding with this phenology difference in *S. parahybum*, are the reported observations of Scarlet Macaws foraging in that area, by Greg Sho, tourists, and members of Trek Force (Greg Sho, Tony Garel, pers.com. 2002). Within the Upper Macal and Raspaculo river valley, the following trees were in fruit and probable providers of food resources for the Belize Scarlet Macaw population:

* Few seeds/fruits *** Larger amounts/seeds/fruits

*** *Cecropia obtusifolia*

Mt. Trumpet * *Cedrela odorata*
Cedar *** *Cordia alliodora*
Salmwood * *Dialium guianensis*
Ironwood * *Schizolobium parahybum*
Quamwood *** *Sloanea tuckerheimii*
Wild Atta * *Spondias mombin*
Hogplum * *Vitex guameri*
Fiddlewood *** *Xylopia frutescens*
Polewood * *Zanthoxylum kellermannii*
Prickley Yellow

In addition, Scarlet Macaws were observed eating the seeds of a vine which neither Eligorio Sho nor Sharon Matola had previously observed, nor have we seen this reported in other data from Scarlet Macaw biologists working within the Selva Maya region. Seeds were collected, and identification will be attempted through Mr. Hector Mai, at the National Herbarium in Belmopan.

ARCHAEOLOGICAL SITES

While following what appeared to be a nesting pair of Scarlet Macaws to a suspected nesting tree along the floodplain of the Raspaculo river, we came upon an Archaeological site which appears to be an undocumented and unlooted grouping of burial mounds leading to a larger Maya complex as it extends further back into the forest. Given the close proximity of this find to the larger ruins which have been excavated at Las Cuevas Research Station, we are assuming that this site could have been part of this complex, however, expertise from the Belize Department of Archaeology would be necessary for a more accurate assessment.

DISCUSSION

The data we have collected during this field investigation, and since the beginning of the Scarlet Macaw study in 1998, corroborates with information available on parrot habitat requirements and movements. Parrot species are capable of moving hundreds of kilometers (Levey 1988), but only recently is the ranging pattern of rainforest parrot species becoming partially understood. Parrots, including macaws, are mainly herbivorous, mostly eating the seeds inside fruits, but also eating the flesh

of fruits, flowers, buds, leaves and bark (Juniper and Parr 1998). Parrots switch resources seasonally, probably to track the high variability of seed and other food abundances in space and time (Renton 2002). This diverse and variable diet would require movement at daily as well as seasonal time scales. Scarlet Macaws apparently fly daily from roosting to feeding areas and can range over many kilometers (Janzen 1983; Marineros & Vaughan 1995). Various species of Macaw are known to have extensive but largely undescribed seasonal migrations (Stiles and Skutch 1989). For example, the Great Green Macaw, Ara ambiguus, migrates seasonally and uses a variety of habitats at different elevations (Martinez-Sanchez 1991; Stiles and Skutch 1989). Within the Selva Maya, current field investigations in Guatemala show that Scarlet Macaws follow a migratory or commuting route of some 120 kilometers or more (Marie-Clare Paiz 2000, pers com).. We feel that the results of this two week field investigation further supports Mallory's theory that the Scarlet Macaws in Belize utilize both the eastern and western river valleys of the Central Maya Mountains in order to sustain their remaining population. It again appears that the western portion is utilized as a principal breeding ground, while foraging for available food resources occurs throughout the entire river valley, both eastern and western sides of the Maya Mountains.

Furthermore, the local commuting route for these birds appears to be, as first suggested by Mallory, the river valleys which presumably pass towards one of the lowest places on the main Divide of the Maya Mountains, separating the Chiquibul from the areas to the east (Mallory and Matola, in press). Given the data from 1993, 2000 and now, 2002, it appears that the Scarlet Macaws in Belize regularly fly to and from Chiquibul and Cockscomb, and that this is an annual pattern. Given this evidence, it is likely that the Scarlet Macaws in Belize are one population which ranges widely on both sides of the Divide. If the Scarlet Macaw population ranges over this whole area, it suggests that a considerable amount of suitable and undisturbed habitat is needed to conserve the species in Belize (Mallory 1993). .

As in previous years, the Upper Macal and Raspaculo River valley reveals itself as a principal breeding ground for the Belize population of Scarlet Macaws. The habitat is a rare floral floodplain, classified as "riparian shrubland in hills" serving as critical habitat for resident and non-resident fauna and avifauna. In all of Belize, including the Upper Macal and Raspaculo rivers, the Upper South Stann Creek, Esperanza River and Ceiba Grande River, this rare habitat covers only 0.03% of the total surface of Belize and 80 percent of this floral floodplain is found in the Upper Macal and Raspaculo Rivers (Meerman 2000). For the Scarlet Macaw, this floodplain provides optimal conditions for nesting. The birds need trees that are tall and have cavities large enough to contain nestlings and permit adults to enter without excessive damage to their tails (Marineros and Vaughan 1995). However, our observations show that even if a tree has a suitable hole, it may not be used by Scarlet Macaws for nesting if vines are present on the trunk. We believe that this allows access to the nest by predators. This observation has also been noted by Guatemalan Scarlet Macaw investigators (Billy 1999 pers. com.). Predation is an ever-present threat to Scarlet Macaws. During the 2001 field season, one nest monitored throughout the breeding season lost two

chicks to a Tayra, Eira barbara. While not climbing directly into the nest, the Tayra climbed a nearby tree, which had vines along its trunk, to observe the nestlings. When they fledged, the Tayra readily saw where they "landed" upon their first flight. This was upon a low brushy area. The Tayra quickly climbed into this shrub and killed and ate both fledglings (Matola 2002). Adult Scarlet Macaws are extremely predator-wary. The Quamwood trees chosen for nest sites always provide the birds with a complete view of the forest around them. This is supported by Meerman (1999a), who stated that nesting Macaws in isolated trees along the floodplain had a "sense of security", in that they could readily view the surrounding terrain.

The floodplain habitat, saturated and scoured by seasonal floods, provides a natural "damage situation" where the Quamwood found in these areas have broken limbs or sometimes, decaying trunks, which frequently provide cavities for nesting. The density of nest sites will closely correlate with the density of large damaged trees (Minty 2001). The density of large trees in the Chiquibul Forest is higher on or near river floodplains, and more suitable sites tend to be found in the river valleys. This is supported by previous research which found that the density of different tree-size classes within broadleaf forest was significantly correlated to seasonally flooded rivers (King 1999), and does predict that the density of Macaw nest sites will be highest near seasonally flooded rivers. Further documentation of commuting routes, food resources, reproduction strategies and seasonal shifts in distribution by the Belizean population of Scarlet Macaws is needed in order to develop a solid plan for their conservation. However, all field investigations to date strongly indicate that the Scarlet Macaws of Belize require a large expanse of forest in order to sustain their population into the future.

Subsequent to the field investigations ending 25 March, Eligorio Sho, Sharon Matola, and Tony Garel went to Red Bank to interview villagers there about recent Scarlet Macaw sightings. Five people were interviewed. Two reported not seeing any Macaws for all of March. However, the remaining three reported seeing pairs of Scarlet Macaws (not numbering more than 2 pair), flying upon the ridges beyond their village. All three people mentioned hearing Scarlet Macaws in the evenings, no later than 4:30 pm, but beyond their field of vision. All people interviewed said that they believed the Scarlet Macaws were seen in less numbers this year as a result of vegetation destruction caused by Hurricane Iris, October 2001. When we climbed the hillside, we saw no Polewood, Xylopia frutescens, or Wild Atta, Sloanea tuckerheimii, in fruit. These are the primary food resources which have attracted Scarlet Macaws into these areas in the past. While the Upper Macal and Raspaculo River valley is key to the natural history profile of the Scarlet Macaw, it would be wrong to ignore the significance which this area plays to the cultural history of Belize. Our continued finds of Maya sites deserve the attention of the Department of Archaeology. Our concerns are reflected in the enclosed letter from archaeologists Diane and Arlen Chase, who have been undertaking Archaeology field studies in Belize for over ten years at the site of Caracol, one of the region's largest Maya sites (Fig 5). Caracol is also considered to be closely associated with the location of our finds of Maya sites in the Upper Macal and Raspaculo

River valley. Comments from archaeologist Dr. Elizabeth Graham, who has worked in Belize for over thirty years, also supports the need to investigate this area for its contribution to the cultural history of Belize (Fig 6).

Other Species Noted 11-25 March 2002:

Mammals ("H" = Heard)

Primates

Alouatta pigra
Mexican Black Howler Monkey "H"
Ateles geoffroyi
Spider Monkey

Carnivores

Potos flavus
Kinkajou "H"
Lutra longicaudus
Southern River Otter
Felis concolor
Puma

Perissodactyl

Tapirus bairdii
Central American Tapir

Artiodactyl

Tayassu pecari
White-lipped Peccary

Birds (significant sightings)

Agami agami Chestnut-bellied Heron
Sarcoramphus papa King Vulture
Elanoides forficatus American Swallow-tailed Kite
Ictinia plumbea Plumbeous Kite
Leucopternis albicollis White Hawk
Buteogallus urubitinga Great Black Hawk
Buteo brachyurus Short-tailed Hawk
Spizaetus tyrannus Black Hawk-Eagle
Spizaetus ornatus Ornate Hawk-Eagle

Reptiles

Micruridae
Micrurus diastema Coral snake
Crotalidae
Bothrops atrox Fer-de-Lance
Crocodylia

Crocodylus moreleti Morelets crocodile

Temperatures recorded 6am, Fahrinheit: 12-25 March 2002

March

12 62 13 64 14 60 15 72 16 72 17 69 18 68 19 68 20 71 21 68 22 69 23 68
24 66 25 65

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