

## **Potential Framework for Community Monitoring Program**

**Pilot Community: Santa María de Cocos**

**Initial Focal Species: *Ara militaris*- Military Macaw – Guacamaya Verde**

**Created by Jennifer Lowry for CONANP/ Peace Corp & baseline for Fulbright Grant**

### ***Need for Monitoring:***

Denoted as Appendix 1 of CITES and classified as endangered in Mexico by SEMARNAT in 2002, the Military Macaw (*Ara militaris*) has only 4 unique but fragmented populations in Mexico (Rivera-Ortíz et al. 2008). These populations consist of 30-90 individuals, however, not much is known about their ecology because of the difficult access to remote breeding and foraging sites; where not much published information is available (Carreón 1997, Loza 1997, Gaucín, 2000, Gómez-Garduño 2004). Limited foraging studies have been completed in Mexico, but suggested that the Military Macaws are specialized grainivores and have a limited but variable diet seasonally (Contreras-González et al. 2009).

Limited published information is available on their breeding ecology, but it appears that populations of Military Macaws do not share a synchronized breeding schedule. In the Sótano del Barro area, Gaucín (2000) suggested that pair formation starts November and terminates in February, with the primary nesting period being from May to June. This study lacks fledgling data and only located 7 nests in the Sótano del Barro and 2 nests in Arroyo Hondo, but suggests more nests were present and included Chuveje as a potential nesting site. Nests were formed on cliff sides, though populations on the pacific side nested in tree cavities (Forshaw 1977, Carreón 1997, Loza 1997). The Military Macaws that were censused in Cañón de Arroyo Hondo from 1997-1999 shows that the population abundance changes monthly, with no way to predict abundance unless more is understood about their ecology. For example, in September 1997 there were about 75 birds, in September 1998 there were about 23 birds and in September 1999 there were about 58 birds. In December, January, February 1998 there appeared to be 0 birds, but the following year (1999), there were about 10-28 (not respectively) birds during those months. Please see Graph 1 from Gaucín (2000) for details.

Threats to these birds include habitat loss and the illegal pet trade. Climate change may increase threats, especially as not much is known about the ecology of these birds and if altitudinal migrations are driven by availability of seeds and fruit that could change in response to climate. Community monitoring can be a way to increase the knowledgebase as nothing has been published since 2000 in this region of the Sierra Gorda Biosphere Reserve. Additional benefits of community monitoring include lower costs than a professionally staffed monitoring program, increased stability if funding or government changes, educates the community on their environment and needs to conserve resources, empowers the community, and also can improve the social fabric of the community by increased communication and trust by creating a safe space for dialogue.

### ***Recommended Methods for Pilot Community Monitoring Program:***

#### **Technical Science Methods:**

Transects to count birds are not recommended because it is a one species focus where roosting is known, and the time and energy spent on making transects may not produce good

results. Vegetation transects or plots should be established in foraging, perching, or areas where Military Macaws have been found. Fixed census points should be established around roosting sites at the Sótano del Barro to census populations leaving at dawn and returning at dusk, and potentially during extreme mid-day temperatures. Fixed observation points should be designated, with the later possibility of creating observational towers as long as there is no ecological risk with towers falling into the Sótano del Barro if future maintenance, weather, or earthquakes may be an issue. Each census point should offer 180- 360 degree view of the Sótano del Barro. Radio communications can be supplied to observers to prevent double counting. Training must emphasize controlling bias, especially with double counting of birds to ensure data quality.

To evaluate behavior and how habitat is used, time budgets will be created. Military Macaws should be followed at a distance, if possible, with detailed documentation on behavior and foraging. This may not be possible at first, but through time, strategic exploration of surrounding areas at different times of the day, information shared by the community, and possibly, with trip cameras, GPS locators (Director banned GPS and Telemetry for Military Macaws previously), and playback of vocalizations, may provide very useful information on understanding the ecology of these birds.

During pair formation and breeding season, attempts will be made to document behavior, nests, and fledgling success. If possible, but must be extensively thought out, an expedition into the Sótano del Barro after incubation has started to count nests not visible from the top of the Sótano del Barro may be an additional goal. Extreme care must be given to not introduce any exotic species, especially seeds stuck on boots or clothing, to this unique ecosystem. Care must be given as well to prevent unnecessary disturbance to birds, but birds tend to have higher nest fidelity after incubation has started and are less likely to abandon the nest.

GPS tracking devices or telemetry may be used in the future but are not an initial focus. Trapping birds though may be a bad idea if the community is involved, because it may accidentally teach them how to catch them for sale to the illegal pet trade. Also, if done, it should only be tested on 1 or 3 birds, and trapping method will have to be chosen carefully.

### **Social Science Methods:**

Weekly community meetings will be conducted in a space that promotes open dialogue to discuss sightings of Military Macaws and ecological knowledge held by the community. Community mapping of resources, different forests or unique ecological areas, water bodies, and sightings will be created on a large dynamic map that anyone can add too, whenever a new item needs to be documented. This map can be made of paper, a large erasable board where boundary lines are drawn in permanent marker, or magnetic board with unique magnets the community can make, or maybe the community has their own ideas on how to make this. Communication through creative means is good for avoiding conflict, is a good way to manage conflict if issues arise, and can also help shy community members the opportunity to share their feelings, concerns, or ideas. It can be fun as well. Besides community mapping, different activities such as dinamicas, workshops, and organic dialogue primarily focused on communities concerns and future vision of their natural resources and biodiversity will also be performed.

This base and community map will make the basis for determining focal areas of Military Macaw observations outside of the roosting area in the Sótano del Barro. Any member interested in documenting the birds will be given a notebook, binoculars, and field guide for explorative surveys of Military Macaws and also for the more scientifically controlled census of the population in the Sótano del Barro.

Over time, this may expand to predator and other species documentation through trip-cameras, bird lists, plaster casts of animal footprints, bark impressions using clay or crayons over paper, creations of dichotomous keys using photos from the area, sound recordings, or possibly, a community biodiversity library complete with an herbarium, photos of wildlife contacts, bird list of the area, and other visions the community may have. This ownership will give the community empowerment and a sense of pride that may make conservation a priority for them in this area, even if future funding or support is lacking.

**Application of Science and Social Methods:**

To start the weekly meetings, a leader from the community will need to introduce the team, which could be the director of CONANP, a biologist, a sociologist, and support staff when needed. Community may be skeptical of the intentions of outsiders, so it is important to maintain sensitivity and understand the regional and community culture, religion, and superstition if applicable. Livelihoods must be understood and respected, especially if planning meetings, census schedules, and exploratory surveys, to make sure there are no conflicts with local harvests of corn or other crops, or other daily, weekly, monthly community activities. Small economic and other incentives can be offered, but needs to be available to all to prevent jealousy and creation of community conflict. For training, thorough explanations on why scientists collect information in a standardized way will need to be emphasized on a regular basis. Environmental education, outreach, and celebrations for Military Macaws or other biodiversity will aid in cultivating a culture of conservationists.

**Aspects to Consider:**

Community may not want a program and outsiders may take a while to build community trust. Think ahead on planning for disseminating information to professionals, online, and the community. This is especially important for data analysis if there is not a biologist living on site or if future funding or support may be lacking; an efficient, low environmental impact to collect data, provide guidance, and give feedback should be thought about at the beginning. One way of achieving this is through an internet portal where data could be uploaded in an easy way with a slow connection (if available). A Mexican sociologist may be needed if complex conflicts arise in the community, such as a livelihood failure, problems with resources, especially water, or any event where community discord arises and the community is unable to work together to solve this.

Respecting the unique ecology of the Sótano del Barro by making sure people don't throw garbage or materials into it, especially if it can spread invasive species, is critical. Mapping invasive species may also help to control threats. If any work is done inside the Sótano del Barro, a stringent protocol should be made and followed to minimize impacts.

Permits will be needed for any collection, including photographs some say, from SEMARNAT. This can be done by linking up with professors from Universities and being placed on their permits. Community member may also need permits as well.

**Thinking of Details:**

Such as transportation, data management, equipment, support staff, protocols for emergencies, illegal harvesting, or conflict. Permits and respect for Federal and Local laws. Equipment logistics: where to get supplies, what type of supplies and equipment, how much, and reasons why equipment is needed. How to make display analyzed data in a meaningful way to the community. Will the data help the community?

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