

## **11.0 POTENTIAL FUTURE SCARLET MACAW PROGRAM ACTIVITIES IN GUATEMALA AND EL SALVADOR**

This list is a set of potential activities that the scarlet macaw conservation programs in Guatemala and El Salvador may consider. The activities were generated from and inspired by the workshop discussions. In compiling the list we did not include consideration of the realities of available funding and manpower. These realities will limit and otherwise influence selection of which activities will eventually be undertaken. The activities are listed first for Guatemala and then for El Salvador.

### **GUATEMALA**

#### **G11.1 Conservation**

- Continue efforts at habitat preservation including:
  - Fire suppression
  - Prevention of illegal colonization
  - Prevention of illegal logging
  - Prevention of illegal clearing for agriculture
- Prevention of poaching
  - Monitoring of nests to detect poaching and use of anti-poaching patrols
- Promote social support for macaw conservation
  - Environmental education with local schools
  - Employment as macaw guards at key nesting foci
  - Publicize the plight of macaws via popular articles, scientific papers, presentations
  - Ensure governmental decision makers are kept abreast of the state of macaws

#### **G11.2 Monitoring and Applied Research**

- Continue Vortex analyses
  - Look at sensitivity analysis to determine which life history parameters have the greatest potential influence over the recovery / decline of the population
    - Key life history parameters may include adult survival, chick survival post fledging, number of chicks fledged per nest, percent of the population breeding, nest predation, etc.
    - Obtain local information about these key life history parameters
    - Investigate ways to improve key life history parameters for the population
  - Review previous analyses periodically to evaluate precision and adjust based on lessons learned
- Conduct or continue annual population censuses
  - Develop standardized protocols for estimating annual indices of abundance or population census
    - Conduct annual active nest counts at key nesting foci based on verified reproductive activity (i.e. number of verified breeding pairs)
    - Monitor the number of successful fledges produced annually
    - Monitor the number of management units with active nests
    - Emergent point count population monitoring techniques (i.e. tower counts)

- Develop standardized data collection: how often, for how long, what time of day, what observations to record to
  - Objectives:
    - Determine population structure (based on group size) and numbers of individuals
    - Determine changes in population structure and numbers over time
  - Enlist volunteers in data collection
- Summarize and analyze data from previous years of the project
  - Data to be summarized include:
    - Annual number of active nests per region
    - Nest monitoring (date and nest contents of each check)
      - Number of eggs or chicks, estimated egg/chick age, numbers of evidence of predation events, evidence of nest competition
    - Nest characteristics (depth, width, height, tree species, number of openings, bottom substrate, evidence of habitation, presence/absence of bees or other competitors)
  - Evaluate results
    - Possible additional related data to collect in future
    - Possible publication/dissemination
- Improve artificial nestbox designs
  - Document characteristics of acceptable natural nest cavities for use in box design
  - Make new anti-predator designs (e.g., double-chambered)
  - Investigate and refine:
    - Materials
    - Mounting techniques
    - Maintenance regimes
    - Nesting substrates (i.e. natural wood detritus on nest floor)
- Continue anti-predator studies
  - Continue development and use of in-nest IR cameras to identify other possible predators and reasons for poor nesting success at El Perú
  - Consult with Ursula Valdez (Peru) on *Micrastur* behavior
  - Investigate procedures / interventions to reduce forest-falcon predation
    - Obstruction to prohibit falcon nest access (internal versus external)
    - Culling of falcons at sites with proven predation
- Study effectiveness of anti-bee treatments of cavities
  - Two possible agents: permethrin and carbaryl (Sevin)
  - Initial evaluation during non-breeding season suggested
- Joint ARCAS/WCS nest guarding program with volunteers at El Peru
- Attempt to understand reasons for decline of number of active nests at El Perú
  - Examine population indices (is it due to a declining overall population?)
  - Examine *Micrastur* abundance at comparative sites, including El Perú
  - Compare chick growth rates and nutrition to sites with higher fledging success rates in the MBR (i.e. La Corona)

- Evaluate parental feeding time bouts at El Peru, and compare to sites with higher fledging success rates (i.e. La Corona)
- Evaluate time to cavity re-colonization by Africanized bees after treatment and compare to other sites in the MBR
- Evaluate comparative nest parasite loads at El Peru and La Corona

### **G11.3 Natural History Research**

- Increase understanding of macaw habitat use
  - Document observations of foraging macaws (feeding bouts) recording food species if known, food type (fruit, flower, etc.), or collect a sample of species if unknown
  - Documentation of food resource availability through an annual phenological inventory of known food plants (particularly at El Perú to better understand the timing of suspected macaw “migrations”)
  - When appropriate technology exists, continue satellite collar development to determine landscape movements and habitat use throughout the year
- Institute monitoring of chick growth and development where feasible
  - Weigh, measure (wing, and beak) and photograph wild chicks regularly
    - Allows estimation of how chick is developing and shows if birds suffer from food limitation / starvation
    - Allows comparison with captive rearing in other aviaries
    - Allows us to indirectly evaluate the diets fed to the breeding birds
    - Allows better understanding of how many chicks the adults can raise
    - Digital photos taken from the nest entrance may be useable for aging chicks and assessing development
    - Allows comparative studies of chick development as compared with work in Tambopata and in captive situations
- Diet evaluation and chick nutrition via crop sampling
  - Technique development at ARCAS with sampling at El Perú.
  - Comparison to results from Tambopata, Peru
- Collect any dead chicks and/ or adults for necropsy to determine cause of death
  - Develop protocol for field sampling
  - Identify veterinarian willing to conduct necropsies
  - Develop a protocol for necropsy
- Consider possibility and utility of banding and/or micro-chipping chicks
  - Because window of opportunity for applying closed bands is so short, open bands probably advisable
  - Microchips require special reader and must be injected under the skin
  - Bands can be cut off; microchips can't be removed
- Continue with genetic analyses of wild scarlet macaws.
  - Determine the degree of subpopulation isolation between Belize, Mexico, and Guatemala
  - Use information to adjust Vortex models, and better estimate susceptibility of the Guatemalan population

- Identify if concentrations of nests at significant nesting foci (i.e. El Perú, La Corona, El Burreal) are related to family groups or share genetic affinities of some kind

#### **G11.4 Ex-situ Management**

- Conduct regular health assessments of Aviarios Mariana and ARCAS macaws
- Biosecurity analysis for ARCAS, Aviarios Marianas, and El Perú to evaluate the susceptibility to disease penetration
- Conduct genetic analyses of ARCAS birds
- Apply genetics results at both aviaries to identify most appropriate breeders

#### **G11.5 Population Augmentation Projects**

- Determine from Vortex modeling the potential impacts of different types of population augmentations
- Evaluate the feasibility of the different types of population augmentations (See Chapter 10 for a review of the options). Feasibility should include:
  - Cost
  - Logistics
  - Timing
  - Manpower needed vs manpower available
  - Participants
- Evaluate the risks to the natural wild populations of each population augmentation
  - Determine acceptable level of risk
  - Ensure governmental entities legally responsible for macaws are aware of risks and tradeoffs of each option
- Compare the potential impact on the population to the feasibility and risk and choose which if any population augmentation procedures to conduct
- Identify field locations for population augmentation activities. Smaller scale tests should first be conducted and evaluated under optimized conditions before larger scale and more expensive tests are conducted:
  - El Perú
    - Wild releases
    - Precision releases
  - Las Guacamayas Biological Station
    - Managed (semi-wild) releases
- Evaluate use of in-situ management options cited in Chapter 10

## **EL SALVADOR**

### **ES11.1. Monitoring and Applied Research**

- Evaluate potential foraging habitat for Scarlet Macaws in the project area.
  - Continue monthly tree surveys (~2000 trees) for reproductive phenology and fruit abundance.
  - Calculate extent (area) of forest by forest type (pending classification mapping by USAID-El Salvador).

- Quantify density and size distribution of tree species (on list of potential food resources) by forest type.
  - Analyze carrying capacity of habitat for Scarlet Macaws in the project area
- Assess potential impact of the reintroduction on the Yellow-naped Parrot (YNPA) population in the project area.
  - Develop methods for population status assessment and long-term population monitoring in the project area (specifically, Barra de Santiago-Santa Rita corridor and protected areas).
  - Conduct baseline population survey using new survey method, and evaluate the method.
  - Construct and erect artificial nest boxes for Yellow-naped Parrots in Barra de Santiago mangroves. The mangroves are the primary habitat for YNPAs in the project area; however, the large red mangrove (*Rhizophora mangle*) trees which provide the YNPAs primary nesting substrate have been logged out and therefore the birds are nest site-limited.
  - Conduct nest searches and monitor reproductive success of nests (natural and artificial nests).
  - Conduct health testing on wild adult YNPAs.
  - Conduct study of movements of Yellow-naped Parrots using radio-telemetry to determine if there are habitats outside the protected areas that are seasonally important for the birds. Adults captured for radio-tagging could be sampled for health evaluations.
- Continue assessment of northern Pacific coast historic and extant Scarlet Macaw populations.
  - Conduct oral histories of elders who grew up in the project area to document any recollections elders have of Scarlet Macaws in the area (required by the Ministry of the Environment) and other interesting recollections, for example, the historic landscape.
  - Conduct a field survey to estimate the size of the Cosigüina Scarlet Macaw population.
  - Support and collaborate in research and monitoring of the Cosigüina Scarlet Macaws, particularly monitoring of population size over time, reproductive success, and illegal activities (i.e. poaching, hunting).

### **ES11.2. Conservation/Education**

- Initiate public outreach about the macaw reintroduction project. Identify key communities and audiences to target; discuss the project at annual assembly meetings or with target audiences. Including cooperatives, community-based development associations (ADESCOs), towns, and other associations such as a fishermen's association.
- Institute and support environmental education in the project area.
  - Hold a workshop with local and national educators who are directly involved in community environmental education in the project area (i.e. AMBAS @ Barra de Santiago, Santa Rita park guards, Asociación de Barra de Santiago, SalvaNATURA @ El Imposible National Park, FUNZEL, and others). The objectives of the workshop are to (1) ask each educator to present their 'program'

to the other educators, including giving a sample presentation of the type they give to schools and/or other audiences, (2) have participants (educators) exchange ideas for strengthening each other's programs, and (3) compile a list of materials or equipment that each educator would like to have to improve their program. For example, a Santa Rita park guard gives only verbal environmental education presentations to the 6 grade schools surrounding the Santa Rita protected area because they have no projector to show photos to show the kids. When I asked what he needed to improve his presentations, he told me that the kids really want to see pictures of the animals; the park has lots of digital photos but no projector or laptop to take to the schools or money to even print the photos.

- Strengthen existing environmental education programs with or develop a program focused on a psittacine conservation component for grade schools in the project area, particularly in the vicinity of Barra de Santiago and Santa Rita protected areas.
  - Develop and hold workshops with and for the civil wildlife police officers (Policia Nacional Civil-Wildlife Department) about wildlife laws and better enforcement practices.
- Facilitate a workshop to develop a funding proposal for conservation of the Cosigüina, Nicaragua Scarlet Macaw population using the high-priority Pacific dry forest ecoregion as an added incentive for international involvement (e.g. The Nature Conservancy has major focus on conservation of this ecoregion).
  - Promote programs for reforestation in project area, particularly native species that serve as food and nesting resources for Yellow-naped Parrots and Scarlet Macaws. Possibly funding from grants supporting carbon sequestration activities could be tapped.

### **ES11.3. *Ex-situ* Management Relative to Source of Birds for Reintroduction.**

- Pursue collaboration with aviaries which breed Scarlet Macaws with the future goal of procuring young macaws from them for reintroduction (e.g. Nini de Berger/Aviarios Mariana in Guatemala).
- Evaluate the value of and (if deemed valuable) provide guidance and support for starting breeding programs at Salvadoran government and private facilities that currently have confiscated or pet Scarlet Macaws, respectively (i.e. the National Zoo, FUNZEL, Patricia Bence). Guidance and support could be in the form of hosting experts (e.g. Darrel Styles) to examine the facilities and macaws and provide recommendations for best management practices to optimize potential of breeding. It is likely that some recommendations would be related to housing of birds, for example separating a flock of birds currently in one cage into pairs of birds in breeding cages; support therefore could be for construction of breeding cages.

### **ES11.4. Reintroduction Strategy**

- Prioritize potential reintroduction sites and site-specific strategies (given there is sufficient habitat and local public support). A site-strategy may be a remote site with an *in-situ* pre-release cage with young, well-socialized birds and minimal human presence or it may be a park/education facility with semi-tame park birds (older, captive-kept adults)

encouraged to remain in the vicinity, even nest, and which require long-term maintenance. Outline comprehensive reintroduction strategy to present to the Ministry of the Environment for review and authorization to proceed with the reintroduction.

- Construct facility(ies) depending on priority site-strategy.

#### **ES11.5. Law Enforcement**

- Support the intensification of surveillance for and enforcement of illegal Scarlet Macaw traffic in La Unión, El Salvador which was determined<sup>1</sup> to be the major deposit of Scarlet Macaws poached or captured in the Cosigüina Volcán Nature Reserve, Cosigüina Peninsula, Nicaragua.
- Monitoring and protection of YNPA nests in Barra de Santiago and Santa Rita protected areas

#### **ES11.6. Promote Conservation-based Economic Activities for Communities in the Project Area**

- Reforestation with ramon (*Brosimum alicastrum*), the seeds of which can be harvested for a growing international market in ramon flour and other health food products.
- Ecotourism Markets
  - Promote development of high quality artisan products with nature themes
  - Promote nature tours and nature guide training.

#### **ES11.7. Permitting**

- Obtain permits for all aspects of the research: Yellow-naped Parrot studies require national (government and CITES) permits; health testing requires export/import permits and CITES permits; reintroduction requires national and CITES permits, and if the macaws for release are from outside El Salvador, export/import permits; and working in environmental education in El Salvador requires Ministry of Education authorization.

<sup>1</sup> Camacho and S. Martínez. 2006. Caracterización y evaluación de seis sectores de avistamiento de lapa roja (*Ara macao*) en la Reserva Natural Volcán Cosigüina. Undergraduate thesis, Universidad Nacional Autónoma de Nicaragua UNAN, León, Nicaragua.

