Appendix 12: Suggested monitoring scheme for Saluga & Ghazal PA

Saluga & Ghazal contain some of the last remnants of the original Nile Valley vegetation, and are positioned on an important flyway for migrating birds. These islands are therefore very important for Egyptian biodiversity.

High-quality monitoring depends on two skills: accurate identification, and accurate counting. Thus the populations of securely identified species needs to be counted at regular intervals. Good population estimates of small areas depend on the marking of individuals. Good maps are also important, and we shall provide the highest-quality satellite image available from the QuickBird satellite, that has a resolution of 2 m for colour pictures, and 0.6 m for black-and-white images.

1. *Acacia* and *Tamarix* populations

The key elements of the vegetation are the five species of *Acacia*, and *Tamarix*. Thus the objective of this scheme is to count the populations of *Tamarix*, each species of *Acacia*, and two other rare but important species, *Leptadenia arborea* and *Lawsonia inermis*. The recruitment process to the population will be studied by monitoring flowering, seed-set, seedling establishment and recruitment.

Numbers of these have been counted in 2003, but the criteria for counting were not stated (e.g. were tiny seedlings counted?). As a guide, however, this is a promising start.

With the small total area of the islands, one could consider marking every tree. There are 2878 trees of *Acacia* and 1098 of *Tamarix*, together with 22 *Leptadenia* and 3 *Lawsonia* (plus some cultivated ones), a total of just over 4000 trees. These could each be marked individually with a metal tag punched with a unique number, held (loosely!) by wire around the base: any other kind of written number would fade rapidly in the strong sun, or be ruined by water.

We suggest mapping these individuals onto the Quickbird map so that any plant can be quickly and efficiently found again. Over the long term of several to many years, a succession of images will show vegetation changes, but we expect this to happen only slowly unless there are catastrophes such as fires. What is possible then, with this exceptional knowledge of the true situation on the ground, is to see whether *Acacia* and *Tamarix* trees, or even the separate species of *Acacia*, can be distinguished from the colours on the satellite image. If this is possible, it will constitute a powerful method for surveying other islands quickly. This research will require remote-sensing expertise, and BioMAP will commission the work.

You will have to make a decision about the very small plants, whether to count and mark them or not. We recommend a minimum size in terms of height or base width for a plant to be counted: all smaller plants are classed as '**seedlings'**. We also recommend a second threshold size for '**saplings'**, with larger plants being classed as '**adult plants'**: adult plants are counted and individually marked.

Each year, at a time when nothing was flowering (presumably in winter - say on Dec 31st), 20 adults of each species should be chosen randomly (or all of them in the case of *Leptadenia* and *Lawsonia*) by using random-number tables (or the RAND function on a calculator). These particular trees are monitored throughout the year, and then replaced the following year by a different 20 randomly chosen adult trees.

Individually mark also a random selection of 20 seedlings and 20 saplings of each species at the beginning of the programme - these same individuals will be monitored for several years (until they either die, or are recruited into the adult population). Can these in fact be identified to species ? If not, then mark more individuals (up to 100).

Regular monitoring schedule

- Each week, have a look at all the chosen trees. When the first tree of a species flowers, change to monitoring them twice per week. When visiting each tree, record the degree of flowering on a the following scale:

  0 - no flowers at all
  1 - one to a few scattered flowers
  2 - thinly scattered flowers over the tree
  3 - quite a lot of flowers over the tree
  4 - dense numbers of flowers on many branches
  5 - entire tree thickly covered in flowers

  The trees of some species may only ever reach 2 or 3 on this scale, but this is itself important information about the flowering strategy of the species.

- Every week when an individual tree is flowering, stand by it. Pick a branch with flowers on it, and count and record the total number of flowers on it. Then stand very still and quiet, start a stopwatch, and after exactly 60 seconds, count and record the total number of all insect visitors that are on the flowers of that branch at that moment. Then move to a different branch and repeat. Do this for a total of 5 times for each tree.

- Make a reference collection of the species of visitors

Once per year

- At the end of flowering, estimate the number of branches on each marked tree, and using your counts of flowers per branch, estimate the total number of flowers on each tree. Using random numbers, score whether 100 flowers on each tree have set any seed, and if they have, how many seeds.

- Record whether the marked seedlings and saplings have survived, and if they have, measure the length of each branch. Record those individuals that have grown sufficiently to make them qualify as ‘adult plants’: when they do, you stop including them in the monitoring programme of juveniles, and include them in the adult population.

2. Migrating and Breeding bird populations

The excellent programme of bird ringing and study of migration forms a wonderful beginning to the assessment of the islands’ value for birds: long may it continue.

We recommend that this be complemented by the monitoring of the breeding birds of the islands. This can be done by mapping the territories of individual pairs onto the map of the islands provided by the QuickBird satellite image.

When the males of each species are starting their breeding season, regular patrols in the early morning will reveal the singing positions of each male. These positions are then mapped, and over a period of days you build up a picture of the territories of each male based on their areas of exclusive use.

It would be excellent if mist-netting during the first part of the breeding season could be used to put individually distinctive colour rings on the birds, especially the males but also females if caught. This makes territory mapping easy because individuals are recognisable. If there are no colour rings on the birds, then you can map the territories by looking for regular singing posts of individual males, coupled with the places where fights occur between the males of adjacent territories.

Males often stop singing after the eggs have been laid and the young hatch, so this process is only possible in the early part of the breeding season. Finding the nests and counting the eggs, and then the nestlings and fledglings is the next step.

Target a small group of species known to be breeding on the islands. After a few years, the pattern of breeding territories, and breeding success gradually emerges.

3. Populations of the Rainbow Skink *Mabuya quinquetaeniata*

There is one common diurnal lizard on the islands, the Rainbow Skink *Mabuya quinquetaeniata*. Nocturnal lizards would be much more difficult to monitor, even though they are probably very common. Male Rainbow Skinks have black spots on the sides of the head in addition to the yellow lines that the female has; juveniles are quite different, being black with yellow stripes and a blue tail (see pictures); females are like paler version of the juveniles.

juvenile

adult male

Lizards can be caught using a noose on the end of a pole, or made in some other manner (eg. http://www.macnstuff.com/mcfl/1/lizard.html). Or they can be caught by means of a low fence along which the lizards are guided to fall into a bucket (see http://www.bio.davidson.edu/people/midorcas/research/StResearch/driftfence.htm)
See http://www.fiu.edu/~acaten01/samher2.html fr a summary of methods, and http://www.birdandhike.com/jlboone/papers/YM/ym_herps/catch.htm for a comparison of trapping methods.

Once caught, the lizards should be marked with a number on both flanks with black permanent marker pen. This mark will last a few months (or perhaps less in the fierce sun of Aswan). Don't use toe-clipping as a marking technique.

Every day for a month in spring (to concentrate on adults, and avoid lots of juveniles that are not going to survive well), go out and observe as many individuals of this lizard as possible. If you see an unmarked individual, catch, mark and release it (noting its sex, snout-to-vent length and location where it was first seen [mark on the map]). If you see a marked individual, record its number and location.

From the daily records of unmarked and marked individuals, you can estimate the population size very accurately.

4. Populations of *Adesmia* beetles

The large tenebrionid beetle *Adesmia* (we will need to check its identification, since it could be a *Pimelia* species) is abundant on Saluga, and probably forms an important item of the diet of many birds (as it does elsewhere). Monitoring its populations will tell us a lot about the year to year variation in the conditions of the island (because the beetles are likely to be sensitive), as well as variation in the food supply for vertebrates.

First, choose an area to study, and mark it out in some way. This does not have to be marked out in reality, as long as all rangers know exactly where the limits are. Next, do some preliminary surveys to discover the best time of the day for making a survey of beetles (ie the time when they are most active). This will probably be in the morning or late afternoon (or possibly just before dawn, or just after dusk).

Every day for a month, search the area thoroughly once. Every unmarked beetle should be caught and marked. Create a patch in the middle of the wingcase with typewriter correction fluid ('Corrector'), preferably that is not white, but some other, less brilliantly obvious colour (such as mid-brown: perhaps this colour can be created from white Corrector with some additional pigment). Then write on a unique number with a black permanent marker pen and allow to dry. Then release the beetle back into the same place you collected it from.

The daily records of the number of unmarked individuals caught and marked, and the recorded marks seen, produces powerfully useful data on population size, mortality and recruitment into the population.

mark should be placed here

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