RECOMMENDATIONS FOR A STANDARD MONITORING PATROL PROGRAMME

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Front cover: Using Cybertracker to inventory vegetation in Termit/Tin Toumma © John Newby/SCF

The Sahelo-Saharan Antelope project is a programme designed and implemented to conserve the fauna and flora of Niger's Saharan and Sahelian aridlands. The project forms part of the Convention on Migratory Species (CMS) Concerted Action Plan for Sahelo-Saharan wildlife, initiated by 14 African countries in 1998. The first phase of the Niger project (2006-2008) is funded by the Government of Niger, the CMS, the French Global Environment Facility (FFEM), the Sahara Conservation Fund (SCF) and the French volunteer programme AFVP.

This report forms part of the wildlife inventory and ecological monitoring components of the project, mandated to the Sahara Conservation Fund for implementation. SCF and the author wish to give special thanks to the *Direction Générale de l'Environnement et des Eaux et Forêts* (DGEEF), the *Ministère de l'Environnement et de la Lutte contre la Desertification* (ME/LCD) and project staff in Niger for their support in carrying out this mission.

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1. INTRODUCTION

The Termit/Tin Toumma region of eastern central Niger is the subject of a major project to establish an integrated protected area. Fieldwork commenced in 2006. Phase I of the project is funded by the Government of Niger, the Convention on Migratory Species (CMS), the Fonds Français pour l'Environnement Mondial (FFEM), the Association Française des Volontaires du Progrès (AFVP) and the Sahara Conservation Fund (SCF). The project forms part of Niger's Sahelo-Saharan Antelopes (SSA) initiative under the CMS concerted action plan for Sahelo-Saharan Antelopes initiated in 1998.

The Sahara Conservation Fund (SCF) is playing the lead role in implementing the project's ecological monitoring and research activities.

This report was commissioned by SCF to outline principles and recommendations for routine environmental monitoring at Termit / Tin Toumma, in line with activities to be undertaken (see below).

1.1 Background

Staffing: SCF employs three full time staff, based at Zinder in Niger, to implement Phase I of the project, Dr. Thomas Rabeil (Technical Advisor), Abdoulaye Harouna (Technical Assistant) and Ahmed Oumarou (driver/mechanic). International support and back-stopping is also provided by John Newby (SCF, CEO). In consultation with the communities, the project has formed two teams of local people into community-based monitoring teams (Agents Communitaires or ACs), who are being trained in ecological monitoring.

Activities: The SCF team's work addresses three related sphere's of activity during Phase 1:

a) to achieve community involvement in the establishment and management of a protected area at Termit,
b) to establish a scientific understanding of the basic ecological status and functioning of the Termit/Tin Toumma area
c) to collaborate with national authorities and facilitate coordination of the necessary legal framework to formally gazette a protected area.

1.2 Monitoring Activities 2007

During 2007 SCF staff have already developed a range of tools, experience and activities designed to collect information about the Termit/Tin Toumma system rapidly and learn about the general characteristics of the area. Key developments are summarised in the Annual Report for 2007 (Rabeil, Newby and Harouna 2008).

Data recording methods in the field have been partially standardised by adoption of the Cybertracker system (www.cybertracker.org). The project has developed specific cybertracker routines to handle:

- General ecological monitoring of wildlife, habitats and human activity by project scientists
- A similar general wildlife monitoring sequence adapted for use by local community members trained in use of cybertracker interface
- Monitoring of avifauna by project scientists

- A Cybertracker sequence for use in aerial survey in desert environments.

An aerial survey conducted in November 2007 followed conventional systematic transect methods and is written up with recommendations for future surveys separately (Wacher, Rabeil and Newby 2007).

The local community monitoring effort is still in a trial phase while confidence and familiarity with the equipment is built up, but very promising initial results have been obtained. It is envisaged that the community monitoring effort will be increasingly integrated with a complimentary vehicle-based monitoring schedule (see below) with potential to play an increasingly important role for protected area monitoring into the future.

The general ecological and ornithological routines have been used extensively during field missions through 2007 and a large spatial database has already been built up containing important information for protected area planning. Because the ground-based missions were necessarily exploratory in function in this opening phase of the project, the database content is largely opportunistic in nature.

- It is important to continue the exploratory and opportunistic capture of information as the project continues, and the cybertracker routines are ideally suited to do this.

- At the same time it is now necessary to introduce a more systematic component to ground-based ecological monitoring. The purpose is to create a subset of the data where search effort is controlled and standardised to maximise the validity of comparisons between repeat surveys. This will allow the project management (and in future Protected Area management) to track trends over space and time for selected key indicators of wildlife conservation interest and human impacts.

2. INTRODUCTION OF A STANDARDISED MONITORING PATROL COMPONENT.

Objective: The objective for initiating the standardised monitoring component is to allow the project to track environmental changes of interest to protected area management systematically, providing a scientific basis for internal management review and public communication about progress. Standard monitoring aims to provide reliable information on general questions.

1. how is vegetation condition varying with season in the Termit Tin Toumma system?
2. how are human and livestock land use activities varying with seasons?
3. how do key wildlife species vary in distribution and relative abundance with season and habitat?
4. are there detectable trends in their numbers?

Answers to these questions are required in order to:

- understand the basic constraints and demands on land use in the environment,
- assist decision-making in the promotion of sustainable resource use by local communities and the wider community (oil industry, tourism etc.),
- track progress towards conservation objectives (e.g. to be able to show that rare species are surviving and increasing, and to have a basic framework of data and knowledge available to identify possible reasons and required actions if they are not).

The goal is to set up a minimum framework of standard survey activities that collect pre-determined data sets that can be repeated quickly and efficiently. The minimum framework should generate sufficient observations of selected topics to make comparisons between surveys meaningful, whilst not taking up so much time that other essential project functions are compromised.

2.1 General principles:

- Ensure that the monitoring schedule clearly identifies the units of work to be completed. This requires defining the number of monitoring routes to visit, the frequency of visits and in particular the schedule should identify 'end points', when a monitoring cycle is considered complete. At 'end points' data analysis, reporting and management responses must be assessed and any adjustments to the next monitoring cycle defined.
- The monitoring programme will identify who is responsible for these activities.
- Monitoring design should allow for variation in resource allocation and effort while retaining comparability between monitoring surveys. This can best be achieved by ensuring activities are organised within a standard framework, with more frequent 'low resource surveys' (e.g. involving a single vehicle and observer team working over a limited sample zone) visit a planned subset of (probably less frequently visited) 'high resource survey' sample units e.g. involving 2 or more vehicles and observer teams working simultaneously over a larger sample area.
- Aim to ensure that different monitoring methods (AC patrols, vehicle patrols, aerial surveys) relate to each other in a defined way.
- The primary outputs of monitoring at Termit will serve two functions:

    1) internal information, reports and assessment of management progress and recommendations for future requirements and actions
    2) Generation of reliable information for communication among project partners and to the conservation community.

2.2 Methods

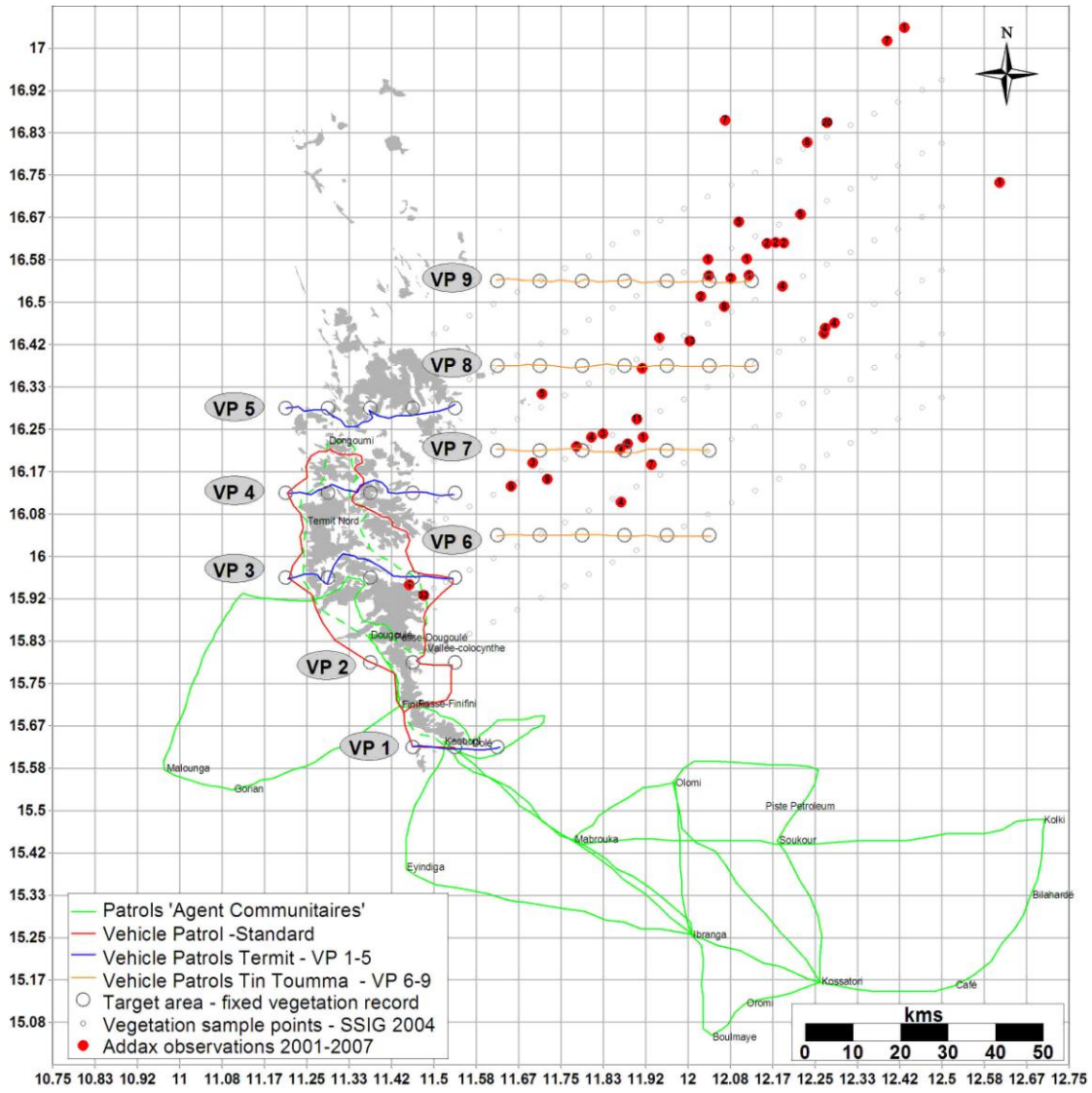
2.2.1 Spatial distribution of monitoring

Identify fixed survey routes of standard length (to standardise search effort) giving full coverage of the area of interest, while also covering priority landscape units. Capacity to visit standard fixed sites along monitoring routes (fixed vegetation monitoring sites, wells, camp sites, vulture nests, etc.) should be incorporated in the route design.

A possible scheme based on transects organised relative to the latitude/longitude grid is given in Fig.1. Reasons for adopting the lat/long grid as a 'base' for monitoring work are:

a) It provides a framework to define coverage and encourage comparable sample effort in all parts of the area of interest at the local scale of the project.
b) Unlike UTM, Lat./Long is continuous over the entire project area of interest.

Figure 1 Proposed fixed patrol routes for vehicle surveys (Red and blue) compared to proposed camel based patrol routes by Agents Communitaires (Green). All addax observations 2001-2007 and vegetation monitoring points Feb. 2004 also shown.



2.2.2 Standardisation of monitoring

- Control observation conditions (aim for a standard start time for each route, with designated speed and direction of movement).
- Use Cybertracker to standardise observations of vegetation, human and livestock use, and wildlife.
- Make provision for GPS/notebook use as a backup to Cybertracker (GPS training and standard recording sheet reflecting simplified version of Cybertracker options.).
- Ensure all participants are trained in general principles and objectives of monitoring and are familiar with details of recording method (Cybertracker and/or backup notebook system) and requirement for each type of observation.
- Ensure 100% recording of pre-defined observation types in the three areas of investigation. (Table 1. below).

2.3 Schedule and monitoring cycle

It is recommended that the project management devise a Vehicle Patrol (VP) monitoring schedule conducted by the project scientific staff along the lines illustrated in Fig.1 and Table 2 . Final decisions on frequency of patrols and proportion of time given to the Termit Massif verses the Tin Toumma dunes will depend on assessment and needs of project field managers.

- Attention must also be given to integration of the vehicle patrol schedules with the camel patrols of the Agents Communautaires (AC patrols) . Recognising that this will require more intensive training and support and that the proposed patrol routes are long (Fig. 1), final integration of these protocols will best be managed by project field staff who are implementing the work.
- An important secondary recommendation is that time be allocated for a cycle of preliminary reconnaissance missions to establish each monitoring route. This is needed to identify, verify and record navigable routes, locate permanent start and finish waypoints, and establish geo-referenced fixed vegetation monitoring sites (including individual trees to be identified for phenology/habitat condition monitoring) and other key sites along the route (wells, campsites, vulture nests etc.). Note that because it is necessary to locate each fixed vegetation monitoring point within a relatively standard pasture (see Annex I) time will be needed to locate these satisfactorily during the reconnaissance.
- At the end of the reconnaissance mission a GPS file should be created defining the exact route and with coded fixed survey points associated with each survey patrol, enabling efficient navigation in subsequent monitoring.
- Once the monitoring patrols are established by the SCF scientific team, there is an opportunity to use them to explicitly plan capacity building and field training, and future transfer of reporting responsibility to protected area staff.

Table 1 Summary of components to be included in monitoring patrol recording. Note that the SCF Termit/Tin Toumma project has made excellent progress in establishing routines to achieve most of these functions through 2007. Additional proposals are filled out in more detail in Annexes I-III.

General	Define pre-determined survey routes as GPS route file with start points, fixed vegetation monitoring points and finish points clearly displayed. See Fig. 1. Always use one waypoint for each observation category. If a campsite of 3 shelters is seen around which are 2 donkeys, 10 camels and a herd of 30 sheep and goats, it is good practice to record 4 waypoints at the observation point, one for shelter information, and one each for each livestock species present. Similarly for encounters with more than one species of wildlife at the same location, or for encounters with two separate groups of the same species at one location (although systems such as Cybertracker can easily handle such information on one waypoint, the recommended format is more efficient in the event of need to use field sheets or notebooks). Ensure Cybertracker (or data sheets) include a comprehensive record of search method and effort (who is on the survey, when/where start, when/where finish, which patrol route, which schedule etc.)
Habitat Vegetation	Fixed photo points in representative vegetated habitat (Two per grid at least 5km apart on standard vegetated land unit) Plus visual estimate of Tree/Shrub/Grass/Herb Abundance and Phenology in Cybertracker See Annex I for details.
Human Activity	Record campsites as encountered Waypoint Number of shelters Record all encounters with people away from campsites Record all fresh human footprints Record all fresh vehicle tracks
Livestock	Record all livestock as encountered: Waypoint of observation point, Distance and bearing to centre of group Species Group size
Wildlife	Record all listed wildlife* as encountered: Waypoint of observation point, Distance and bearing to centre of group Species Group size * All mammal sightings, All tracks of dama, addax*, barbary sheep, cheetah, hyena All bustards and bustard nests (not tracks) All Raptors/vultures (Species, number/Flying/perched/nesting**.) * Develop capacity for rapid record of addax feeding behaviour from track follows, and record all addax dung seen from vehicle (Annex II). **Consider provision of option for 'Species Id uncertain' category and ABBA breeding evidence categories (Annex III) in Cybertracker.

Table 2. Example schedule for routine field monitoring and monitoring cycle reporting. See Fig. 1 for location of patrols (Standard patrol & VP 1-9).

	Termit Circuit	Termit South			Termit North			Tin Toumma				
	Standard Vehicle Patrol	Vehicle Patrol 1	Vehicle Patrol 2	Vehicle Patrol 3	Vehicle Patrol 4	Vehicle Patrol 5		Vehicle Patrol 6	Vehicle Patrol 7	Vehicle Patrol 8	Vehicle Patrol 9	
Jul-08												
Aug-08												
Sep-08												
Oct-08												
Nov-08												
Dec-08												
Jan-09	Report on Monitoring cycle 1											TR / SCF team
Feb-09												
Mar-09												
Apr-09												
May-09												
Jun-09												
Jul-09	Report on Monitoring cycle 2											TR / SCF team
Aug-09												
Sep-09												
Oct-09												
Nov-09												
Dec-09												
Jan-10	Report on Monitoring cycle 3											TR / SCF team

3. DATA STORAGE &REPORTING

It is essential that all monitoring data is systematically combined in a master database, from which it is possible to select and recombine data on search effort and observed results rapidly and efficiently. The SCF project has already initiated a general data base from work done to date. It is important to ensure that this the data base design can be adapted to incorporate new elements required for the standard monitoring patrol inputs.

Six monthly monitoring reports should aim to deliver a concise record of habitat status, human and livestock activity, and wildlife in Termit/Tin Toumma ecosystem. Example outputs that can be produced (though not necessarily required in every cycle).

3.1 Basic reporting

Vegetation:

A plot of tree phenology (stacked histograms and/or maps) in north Termit, South Termit at 2 month intervals.
A plot of grass and herb layer phenology (stacked histograms and/or maps) in north Termit, South Termit at 2 month intervals.
A plot of grass and herb cover estimates (maps)

Humans and livestock activity

Map of camels seen / km by grid traversed.
Map of shoats seen / km by grid traversed
Map of campsites and other pastoral activities
Map of other development activities observed.
Trends in camel encounter rates by zone

Wildlife

Map of dorcas seen/km – plot of trend by zone.
Map of addax seen/km – plot of trend by zone
Map of bustards seen/km – plot of trend by zone.
Map of other contact of interest
Summary of wildlife conflict reports in reporting interval (via AC patrols).

3.2 Summary Reporting

Summary reports collating observations over each 12 month period can be used by the project in a number of ways.

- Explore relationships between vegetation condition, human activities and wildlife; relative abundance indices verses distance from wells, campsites, livestock concentrations, green vegetation; persistence of pasture in Tin Toumma etc.
- Identify project management recommendations, modifications and priorities.
- Create displays / posters from monitoring material for distribution, discussion and planning with communities.
- Produce papers and articles for conservation literature, material for websites etc. .

4. REFERENCES

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Appendix I

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ANNEX I

FIXED VEGETATION PLOT RECORDING:

1) Site selection:

Locate fixed vegetation photo points within a fixed radius of centre point of chosen grid system.

Deliberately select vegetated land units for the fixed photo points. [The primary purpose of the field monitoring is to maintain up to date information on vegetation response to climate by region. It is not to map vegetation distribution as such. The information generated will give field managers a rapid overview of the situation in a format that will be complementary to, but independent of, any remote sensing approaches.]

2) Photo record

Place fixed marker as photo point with a scaling marker of known height (1m) set at a fixed distance from the point marker (15m) to act as a centre point for the image.

Use a standard lens for all photos.

Enter photo frame number/s in Cybertracker).

Useful reference for standard photo point set up: Barker P. 2001 A technical Manual for vegetation monitoring. Resource Management & Conservation DPIWE

3) Rapid visual score of vegetation condition at fixed photo point

Tree Condition
Identify -> maximum 5 closest individual trees at each fixed vegetation plot
Score Leaf phenology (1 no leaves 2 New leaf shoots, 3 full leaf, 4 dry
Score Fruit/Flower status 1 Flowering 2 Green fruit pod 3 Dry fruit/pods 4 No fruits f

Shrub Condition
Identify 5 closest individual shrubs at each fixed vegetation plot

Tussock Grasses
Identify dominant grass species in 50m x 50m plot estimated visually from fixed point.
Score cover value of tussock grass
(0, <5%, 5-10%, 10-25%, 25-50% 50-90% >90%)
Score phenology of tussock grass
(Dead, New shoots, Green flower head, 50-90% green leaf, 5-50% green leaf, dry)

Annuals herbs
Identify dominant grass species in 50m x 50m plot estimated visually from fixed point
Score cover value of herb layer
(0, <5%, 5-10%, 10-25%, 25-50% 50-90% >90%)
Score phenology of herb tussock grass
(Dead, New shoots, Green flower head, 50-90% green leaf, 5-50% green leaf, dry)

ANNEX II

USE OF ADDAX TRACKS AND SIGNS

While addax are low in numbers and difficult and expensive to encounter, it is valuable to maximise information about their habits and requirements by systematically recording all signs of their presence.

Recording dung piles:

During the SSIG 2002 and 2004 vehicle-based transect surveys of Tin Toumma addax were encountered once (2002) and 5 times (2004). But addax dung was sighted from the moving vehicle 48 and 85 times respectively. The relatively higher observation rate has some potential to enhance information about habitat use, but with the serious draw back that it is not possible to assess time elapsed since addax were present in the area reliably.

Nevertheless a simple index of dung pile encounter rate by survey unit collected over 6 days (in this case 5km sectors along the transect) was used to provide a generalised indication of addax distribution. This implied a similar north-east/south-west axis of distribution to that revealed by a plot of all known sightings of addax from 2001-2007 (Fig. 2).

In a series of repeat surveys over the same route it is likely that counting dung piles observed along the route may prove useful to indicate local persistence or local movements around the study area and should not be overlooked.

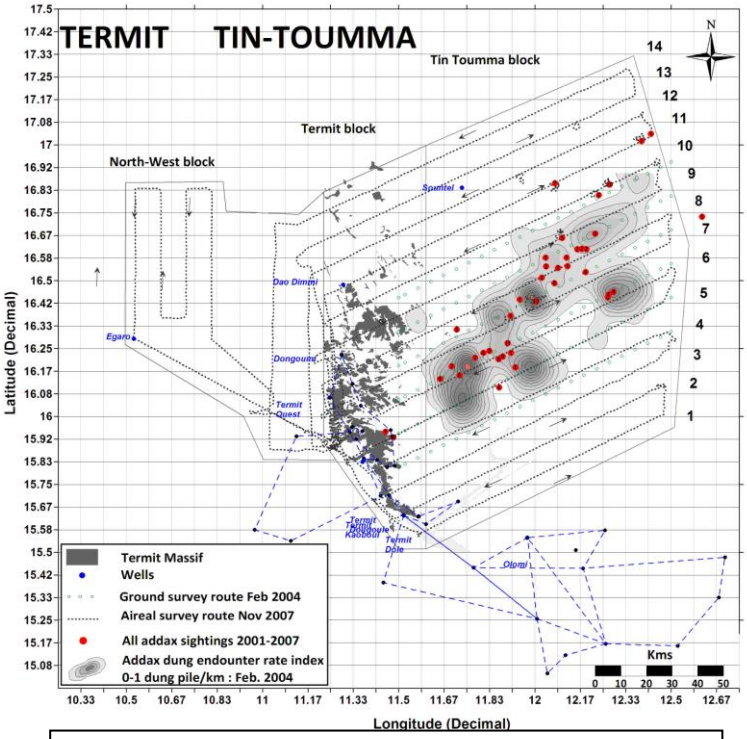

Fig. 2. Addax dung density Feb 2004 relative to all addax observations 2001-2007; aerial survey route 2007 and proposed Agents Communitaires patrol routes.

Recording food plants from tracks

During monitoring patrols of Tin Toumma all encounters with addax tracks will be recorded. In dune pastures, with some simple field rules, it is also possible to accumulate low grade observations on food plant selection rapidly by following tracks and recording each species visited. Each track follow should start from where the tracks are found, always follow in the same direction, note the habitat, enter the name of each plant species visited and fed on (clipped shoots, fresh greenery dropped, tracks pausing in feeding position).

Continue until 1) 10 plants identified, or 2) tracks indicate change of behaviour (lying down, running off), or 3) more than 200m from start point. Mark location and reason for finishing record (from 1-3 above) at the end point of the follow.

It is recommended that a Cybertracker sequence be included to record these observations rapidly in the field.

ANNEX III

Ornithological Monitoring

SCF project staff have developed a Cybertracker sequence in use specifically to record bird observations in the Termit/Tin Toumma region. This incorporates a full species list with capacity record habitat, numbers of individuals encountered and additional notes.

Two recommendations are made:

1) Review cybertracker sequence to facilitate data collection in recognised rapid survey methods e.g. use of Mackinnon lists, or timed species counts etc. (see Bibby et al. 1998).

2) Add capacity for classifying bird observations for breeding status in the field. The code system adopted by the Atlas of Breeding Birds of Arabia project (ABBA), may act as a guide, but could benefit from some simplification, e.g.

Present

Xx - species present but no breeding information collected
00 – Observed in a known breeding season but no other information

Possible Breeding

01 –Observed in breeding season in possible nesting habitat
02- Singing male(s) present in breeding season
03- Pair observed in breeding season in nesting habitat

Probable Breeding

04- Territory presumed through observation of territorial behaviour on two days at least one week apart.
05-Display and courtship, or copulation observed
06-Visiting probable nest site
07-Agitated behaviour or anxiety calls from adult
08-Brood patch on adult examined in the hand, indicating probably incubating
09-Building nest or excavating nest hole.

Confirmed Breeding

10-.Distraction display or feigning injury
11- Used nest or eggshell found
12- Recently fledged or downy young seen.
13-Adults entering or leaving nest site but nest not seen
14 Adults carrying food or faecal sac.
15- Nest containing eggs
16- Nest containing young seen or heard.