ZSL
LET'S WORK FOR WILDLIFE

ZSL CAMERA TRAP ANALYSIS PACKAGE

RAJAN AMIN, KEVIN DAVEY, TIM WACHER

ZSL CAMERA TRAPPING

- BIODIVERSITY SURVEY AND MONITORING
- RESEARCH IN ANALYTICAL METHODS
- TRAINING IN FIELD IMPLEMENTATION
- ANALYTICAL PROCESSING TOOLS
- RANGE OF SPECIES, HABITATS & CONSERVATION OBJECTIVES

ZSL CAMERA TRAPPING

- ALGERIA
- KENYA
- TANZANIA
- LIBERIA
- GUINEA
- NIGER
- SAUDI ARABIA
- MONGOLIA
- NEPAL
- THAILAND
- INDONESIA
- RUSSIA
- Et al.

KENYA: ADERS' DUIKER

COASTAL FOREST

- Critically endangered species
- Poor knowledge of wildlife in the area

MONGOLIA: GOBI BEAR

DESERT

- Highly threatened flagship species
- Very little known about it

NEPAL: TIGER

GRASSLAND AND FORESTS

- National level surveys, highly threatened flagship species

SAUDI ARABIA: ARABIAN GAZELLE

- Highly threatened species
- Monitoring reintroduction efforts

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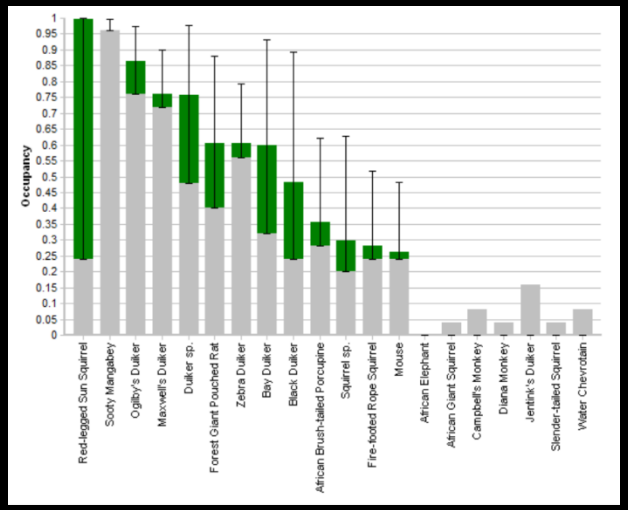
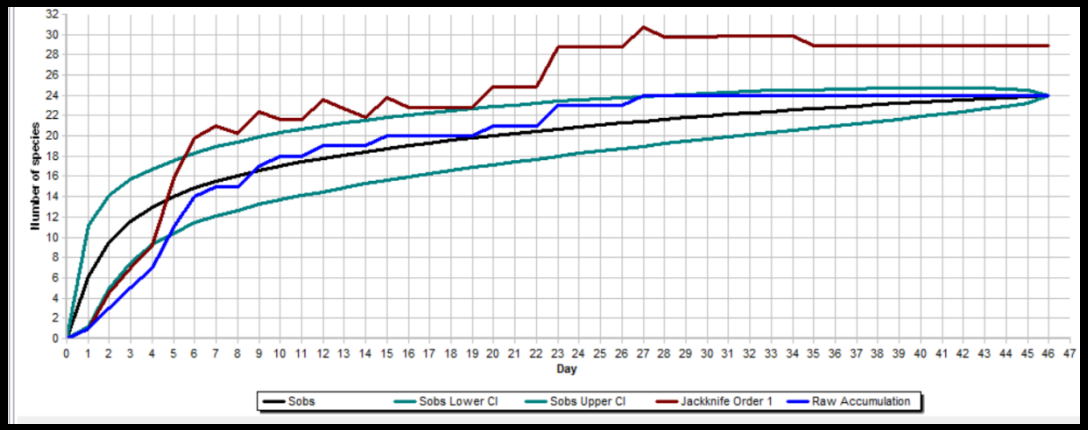
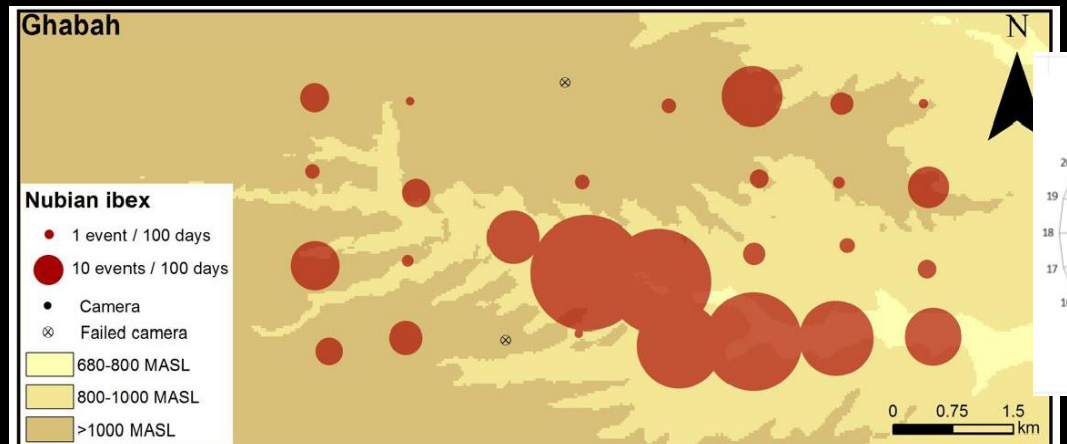
OCCUPANCY



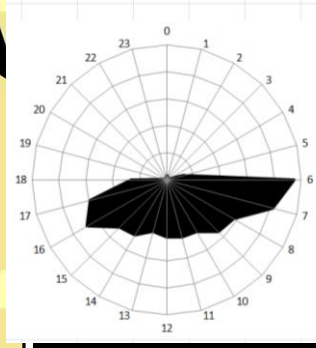
SPECIES RICHNESS

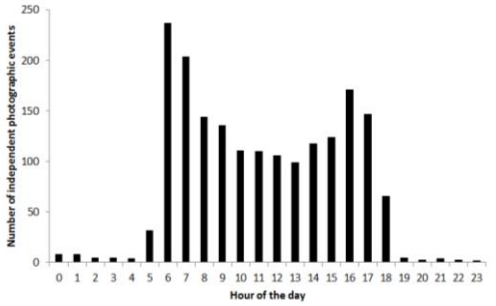


TRAPPING RATE & LOCATION

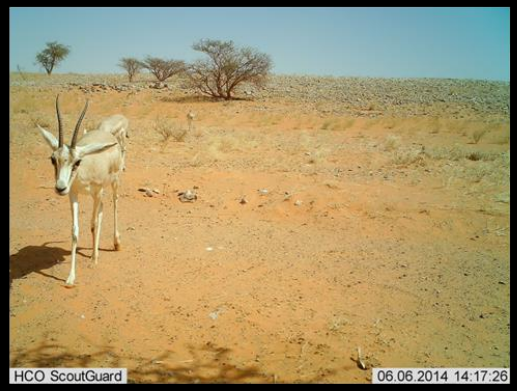


ACTIVITY



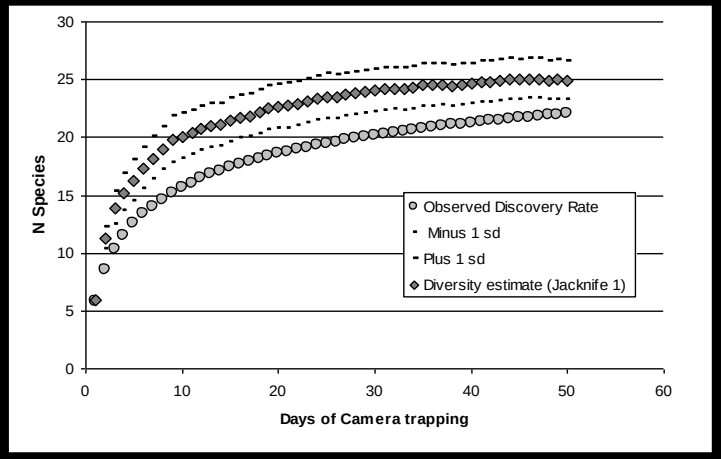


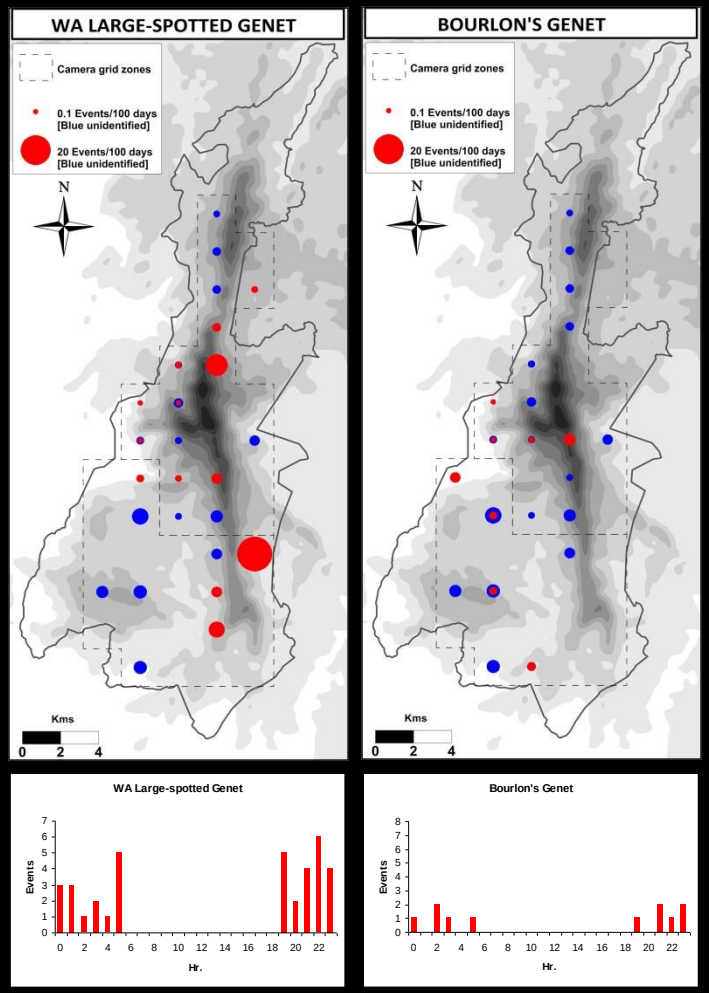
Why is an analysis tool needed?



MANUAL PROCESSING: MULTI-SPECIES STUDIES

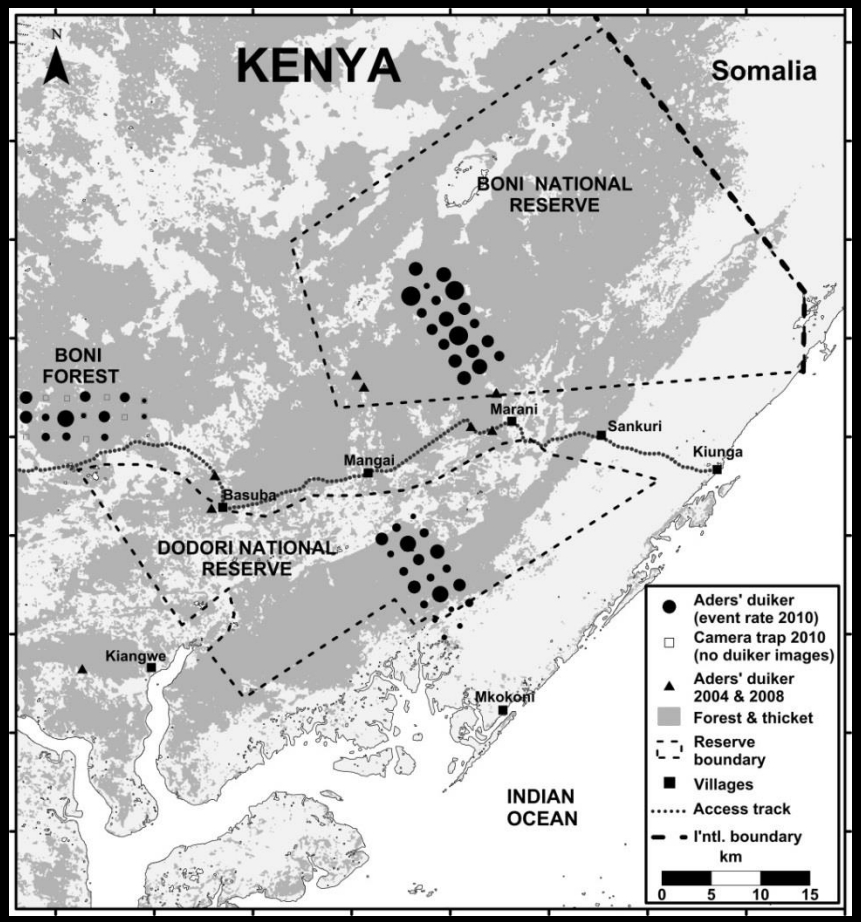
45 cameras x 150days x c.30sp





MANUAL PROCESSING: MULTI-SPECIES STUDIES

80 Camera sites x 100 days x c.30sp



Amin, R., Andanje, S., Ogwonka, B., Ali A. H., Bowkett, A., Omar, M. & Wacher, T. 2014
The northern coast forests of Kenya are nationally and globally important for the conservation of Aders' duiker Cephalophus adersi and other antelope species. Biodivers. Conserv. DOI 10.1007/s10531-014-0842-z

CAMERA TRAP ANALYSIS PACKAGE

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- A DATA MANAGEMENT AND ANALYSIS SYSTEM FOR CAMERA TRAP ARRAYS

Starting Point:

Camera arrays: Guinea 2008 & Kenya 2010

Why is it needed?

- Camera arrays – Create very large data sets
- Multiple species
- Multiple data manipulations required

- Lack of central data management system
- High potential for errors in manual data handling
- Files tend to proliferate during manual analysis
- Lack of standardisation in manual analysis
- Very slow, loss of data, incomplete analyses/reports
- No equivalent package available (when project started..)

What does it do? Phase 1

- Targeted at processing data from camera arrays
- Manages multiple surveys within a single database
- Provides standardised data model for comparison and monitoring biodiversity over the longer term
- Country species templates
- Enables data filtering, image checking, processing and correction
- All tables and graphs produced can be customised and exported in different formats.

What does it do? Phase 1

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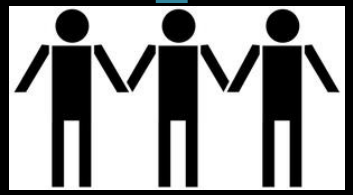
Outputs:

- Survey effort reports
- Species list (taxonomically ordered with information on habitat, habit, tropic level, adult body weight, IUCN Red List threat status) with number of images, number of events and number of camera stations detected
- Rarefaction curves and species richness estimates
- Species spatio-temporal plots
- Species trapping rates with standard errors (overall and daily / seasonal)
- Species occupancy modelling (with sites covariates)
- Distribution plots of trapping rates and occupancy (in Google Earth, QGIS and ArcGIS)
- Activity patterns

ZSL– CAMERA TRAP DATA PROCESS

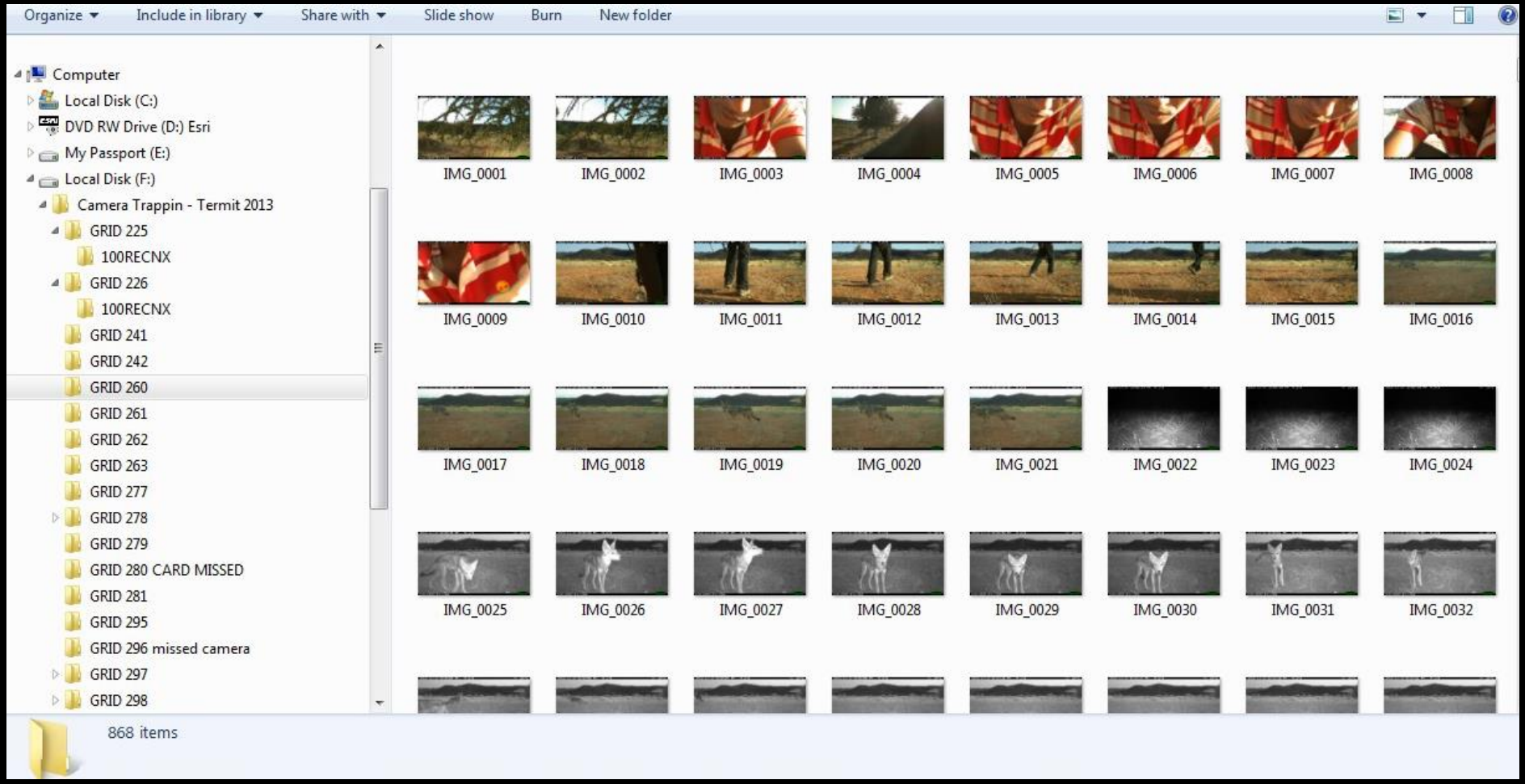
IMAGE PROCESSING

Crowd sourcing?

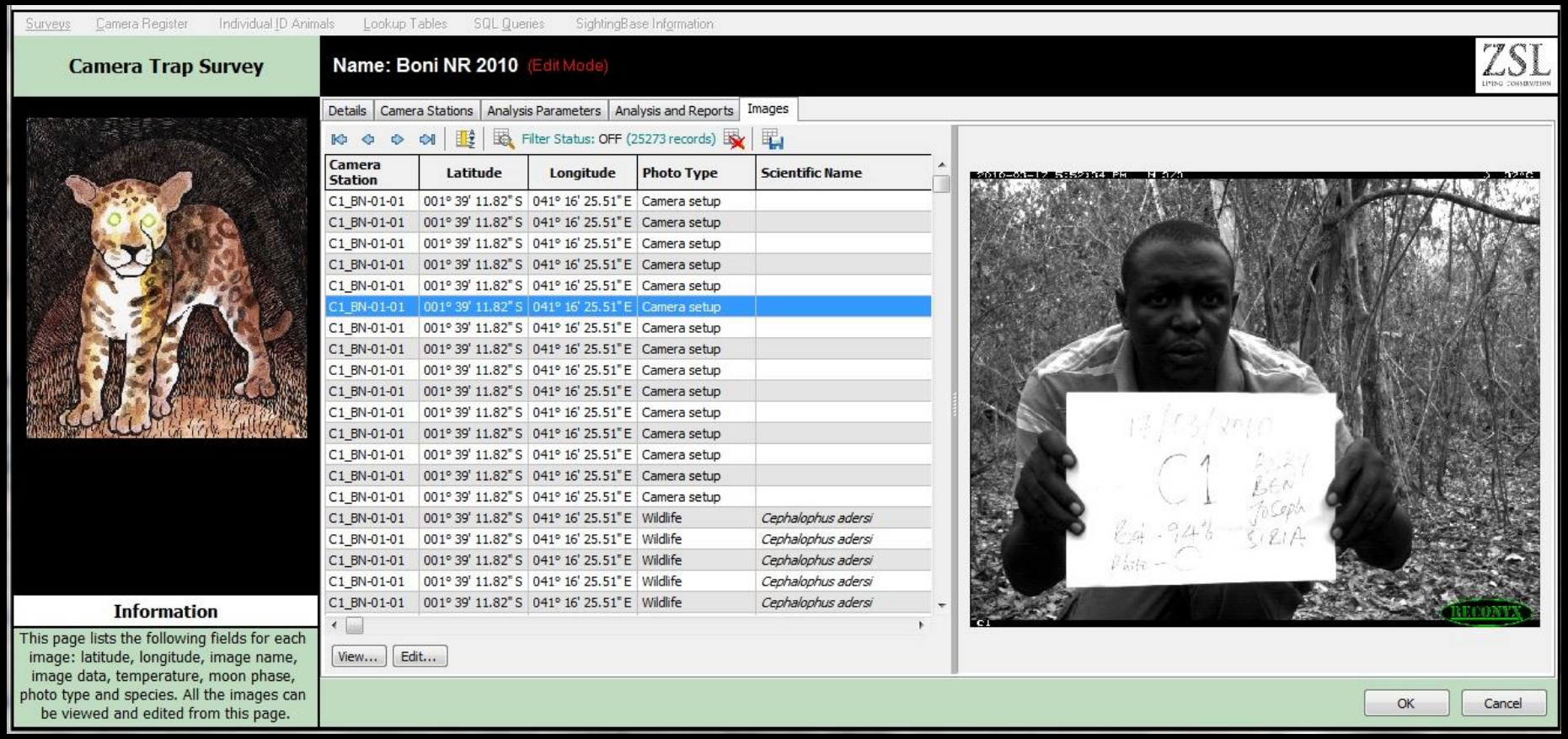


Note: The tool requires appropriate 'R' packages pre-loaded (but no manipulation of 'R' necessary) and computer date/time format harmonised – See manual

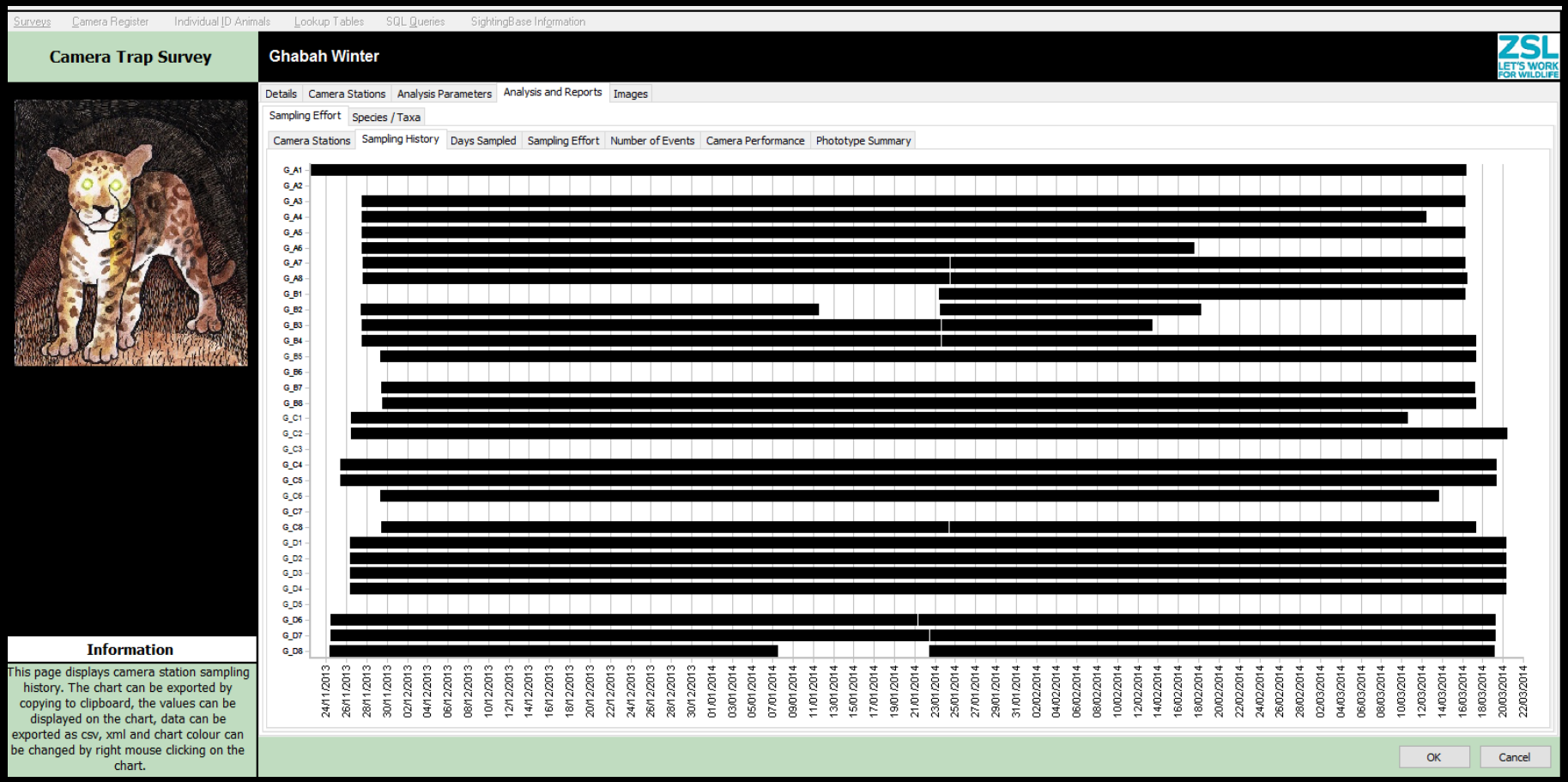
CONVERTS THIS…



TO MANAGED DATA SYSTEM: IMAGE CHECKING, SORTING & EDITING

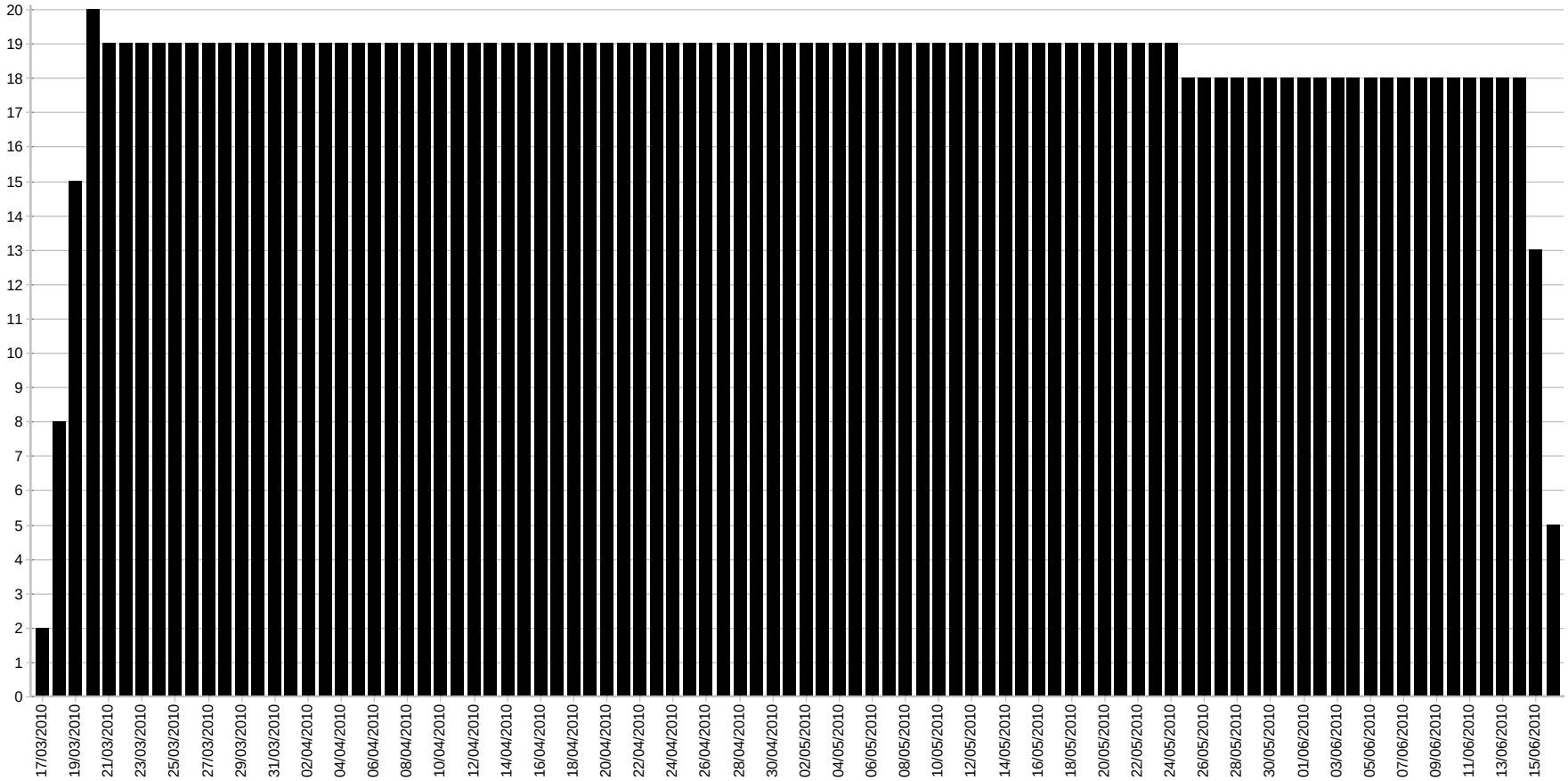


SUMMARY REPORTS: CAMERA OPERATION



CAMERAS STATION SAMPLING HISTORY : IBEX RESERVE, SAUDI ARABIA

SUMMARY REPORTS: SAMPLE EFFORT



No. CAMERAS WORKING ON EACH DAY OF SURVEY : BONI FOREST, KENYA

SUMMARY REPORTS: CAMERA PERFORMANCE

ZSL-CTAT

File View Tools Help

Surveys | Camera Register | Individual ID Animals | Lookup Tables | SQL Queries | < Home

Camera Trap Survey

Information

This page summarises camera performance. The data can be saved as a comma or tab separated text file, xml file, webpage by right mouse clicking on the table.

Boni NP 2010 survey

Details | Camera Stations | Analysis Parameters | Analysis and Reports | Images

Sampling Effort | Species / Taxa

Camera Stations | Sampling History | Days Sampled | Sampling Effort | Number of Events | Camera Performance | Phototype Summary

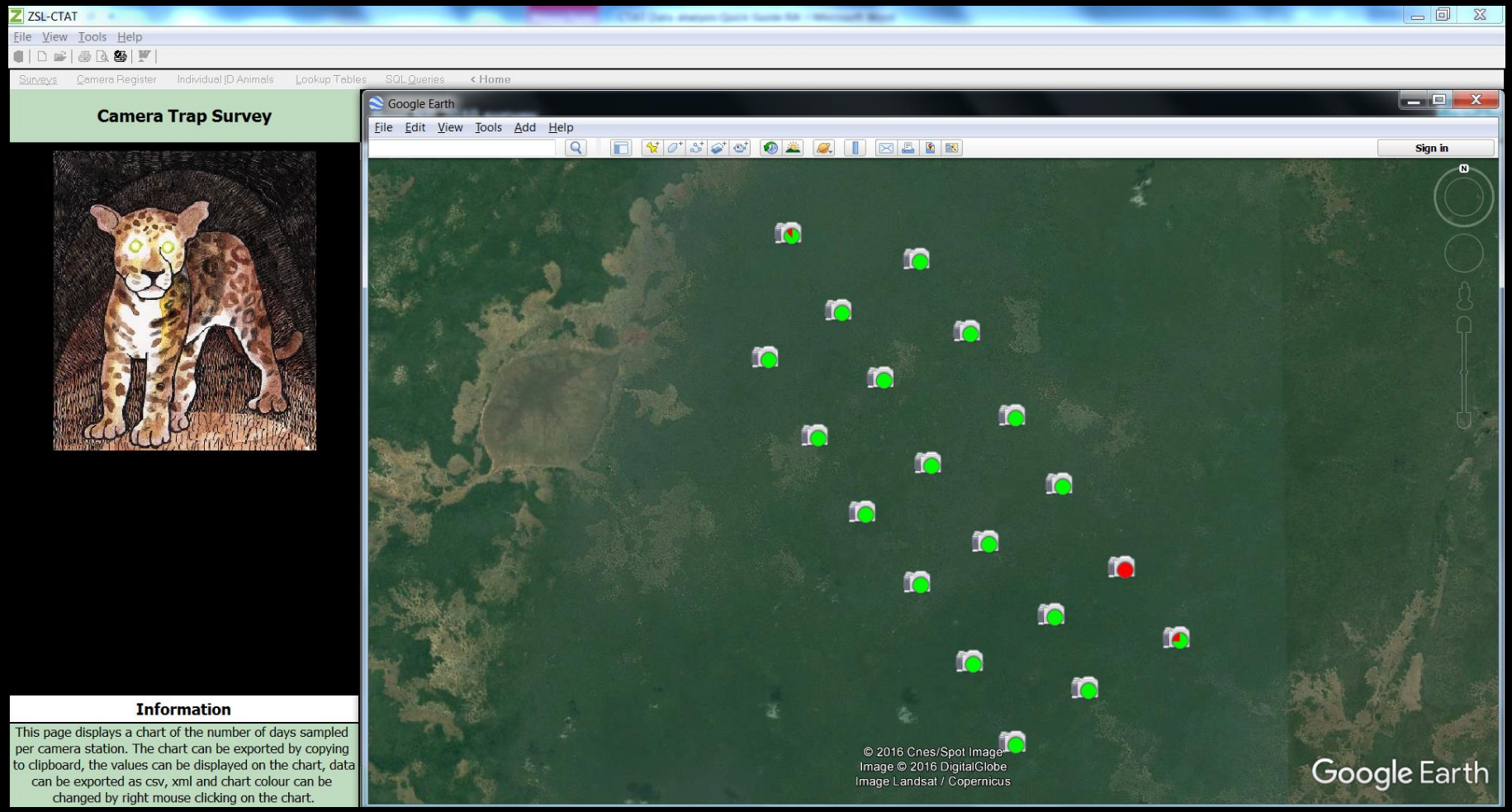
Camera	Camera Station Label	Setup		Recovery		No. Days Deployed	No. Days Operational
		Date	Time	Date	Time		
RM12AB11002458	C7	17/03/2010	17:52	15/06/2010	12:00	90	89
RM12AB11002520	L5	18/03/2010	17:21	15/06/2010	13:00	89	89
RM12AB11002558	C6	20/03/2010	11:42	16/06/2010	07:53	88	88
RM12AB11002568	R4	20/03/2010	09:22	16/06/2010	08:59	88	88
RM12AB11002588	C4	18/03/2010	14:11	15/06/2010	16:48	89	89
RM12AB11002591	R2	19/03/2010	11:37	15/06/2010	12:00	88	66
RM13AB01002831	R3	20/03/2010	09:20	17/06/2010	07:50	89	0
RM13AB01002844	C3	18/03/2010	12:22	16/06/2010	10:55	90	90
RM13AB01002859	L2	19/03/2010	14:35	14/06/2010	13:24	87	87
RM13AB01002865	C2	19/03/2010	09:25	15/06/2010	10:09	88	88
RM13AB01002866	C1	17/03/2010	17:53	14/06/2010	11:18	89	89
RM13AB01002871	R6	19/03/2010	09:22	15/06/2010	09:28	88	88
RM13AB01002885	L4	18/03/2010	16:00	16/06/2010	08:28	90	90
RM13AB01002905	L6	19/03/2010	10:39	15/06/2010	10:11	88	88
RM13AB01002915	L1	18/03/2010	11:59	14/06/2010	15:15	88	88
RM13AB01002954	R1	20/03/2010	10:12	15/06/2010	14:30	87	87
RM13AB01002960	R7	19/03/2010	11:23	15/06/2010	10:15	88	88
RM13AB12002751	R5	19/03/2010	11:42	15/06/2010	11:21	88	88
RM13AB12002795	L3	20/03/2010	09:20	16/06/2010	09:46	88	88

View Images...

OK | Cancel

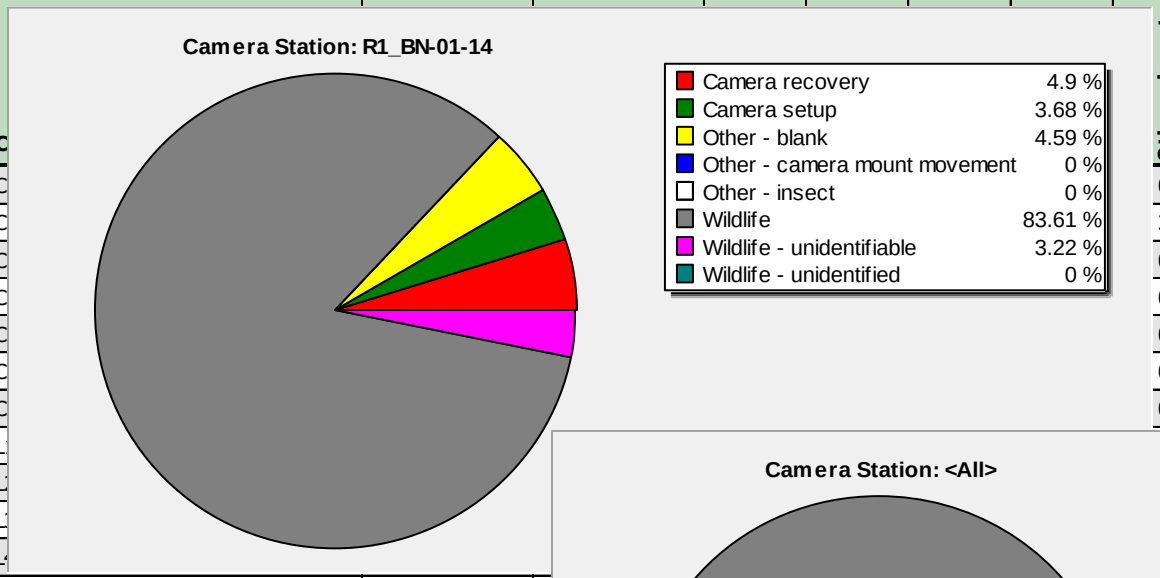
CAMERA PERFORMANCE : BONI FOREST, KENYA

SUMMARY REPORTS: CAMERA LOCATION & PERFORMANCE

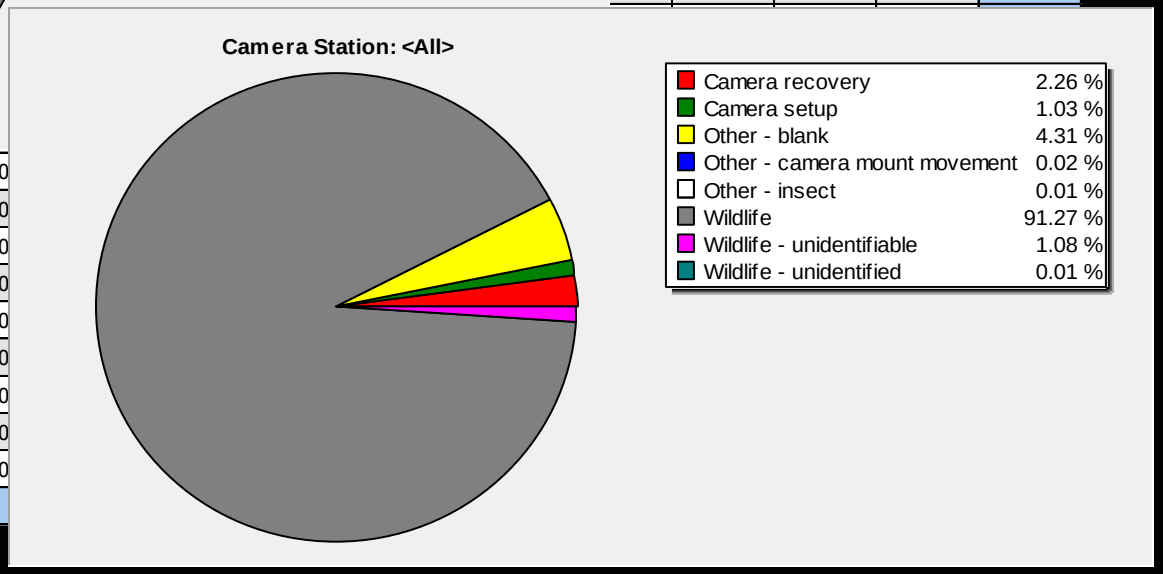


CAMERA LOCATIONS AND PERFORMANCE ON GOOGLE EARTH : BONI FOREST, KENYA

SUMMARY REPORTS: PHOTO TYPE TOTALS



			Other - insect	Wildlife	Wildlife - unidentifiable	Wildlife - unidentified	TOTAL
L5_BN-01-12	001° 36' 14.99" S	0	0	942	0	0	**1058**
L6_BN-01-13	001° 35' 19.15" S	0	3	945	0	0	**1071**
R1_BN-01-14	001° 33' 49.53" S	0	0	2358	0	0	**2397**
R2_BN-01-15	001° 38' 37.09" S	0	0	1332	0	0	**1626**
R3_BN-01-16	001° 37' 47.82" S	0	0	1227	0	0	**1314**
R4_BN-01-17	001° 36' 49.29" S	0	0	111	0	0	**198**
R5_BN-01-18	001° 36' 00.77" S	0	0	672	15	0	**741**
R6_BN-01-19	001° 35' 00.47" S	0					
R7_BN-01-20	001° 34' 08.37" S	0					



BONI FOREST – COASTAL KENYA 2010

COMPILED SPECIES LISTS

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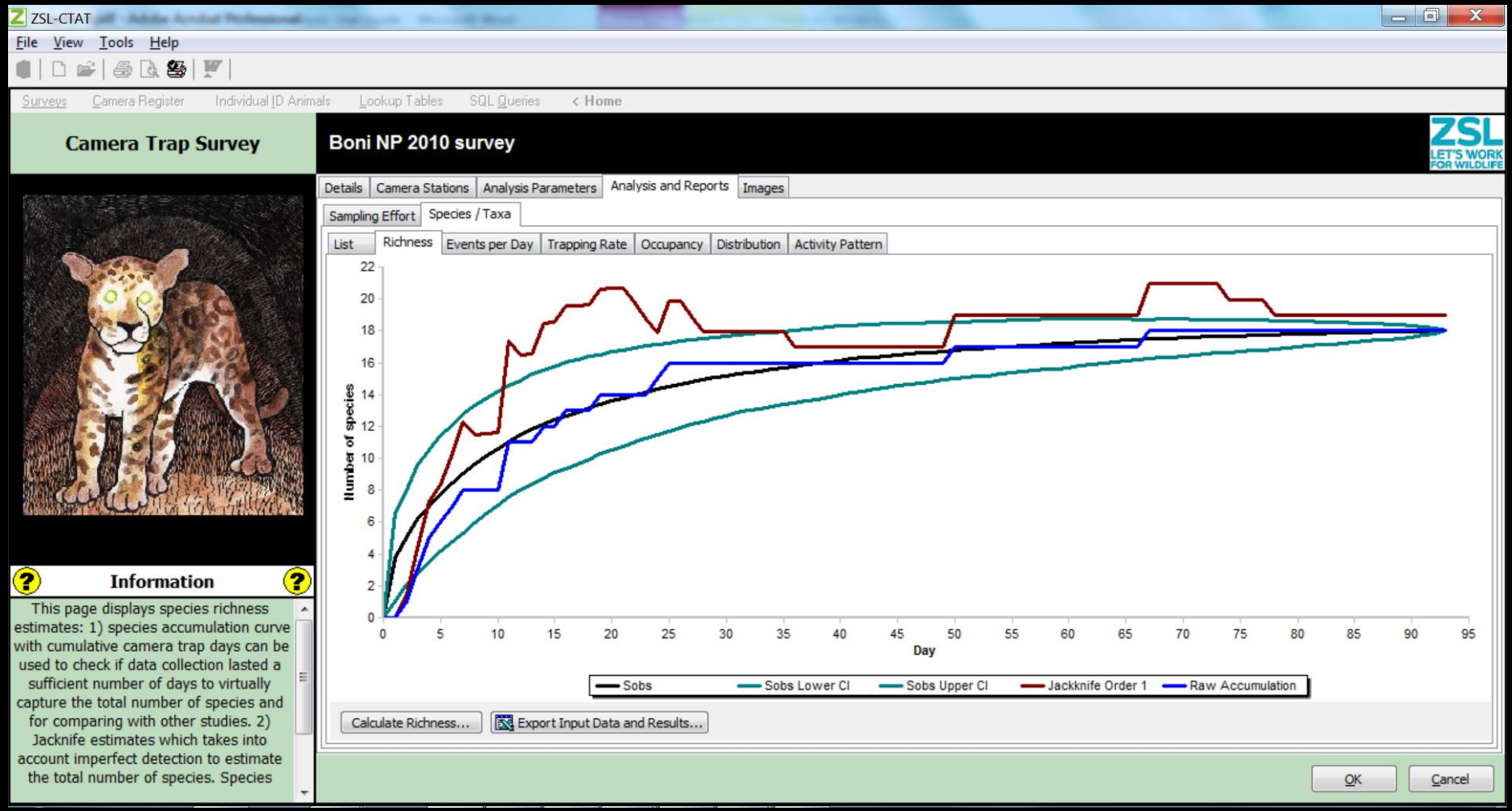
Order	Family or Subfamily	Scientific Name	Local Name	IUCN Status	Habitat	Habit	Trophic Level	Avg. Adult Weight (kg)	Avg. Home Range (km²)	No. of Images	No. of Events	No. of Stations Detected in
Mammalia												
Carnivora	Felidae	*Caracal aurata*	African golden cat	VU	Forest	T	Carnivore	10		6	3	2
Carnivora	Felidae	*Panthera pardus*	Leopard	NT	Mixed	T	Carnivore	40		6	2	2
Carnivora	Herpestidae	*Atilax paludinosus*	Marsh mongoose	LC	Wetland	SA	Carnivore	3		216	59	16
Carnivora	Herpestidae	*Crossarchus obscurus*	Common cusimanse	LC	Forest	T	Carnivore	1		15	5	4
Carnivora	Herpestidae	*Liberiictis kuhni*	Liberian mongoose	VU	Forest	T	Carnivore	2.3		3	1	1
Carnivora	Mustelidae	*Mellivora capensis*	Honey badger	LC	Mixed	T	Carnivore	10		6	1	1
Carnivora	Viverridae	*Civettictis civetta*	African civet	LC	Mixed	T	Carnivore	11.5		60	9	6
Carnivora	Viverridae	*Genetta bourloni*	Bourlon's genet	NT	Forest	T	Carnivore	1.5		30	10	5
Carnivora	Viverridae	*Genetta pardina*	Pardine genet	LC	Forest	T	Carnivore	1.5		24	4	4
Carnivora	Viverridae	*Genetta sp.*	Genet sp.		Mixed	T	Carnivore	0		24	8	7
Cetartiodactyla	Cephalophinae	*Cephalophus dorsalis*	Bay duiker	LC	Forest	T	Herbivore	20		63	16	8
Cetartiodactyla	Cephalophinae	*Cephalophus jentinki*	Jentink's duiker	EN	Forest	T	Herbivore	68		30	7	5
Cetartiodactyla	Cephalophinae	*Cephalophus niger*	Black duiker	LC	Forest	T	Herbivore	22		33	10	6
Cetartiodactyla	Cephalophinae	*Cephalophus ogilbyi*	Ogilby's duiker	LC	Forest	T	Herbivore	17		276	71	20
Cetartiodactyla	Cephalophinae	*Cephalophus sp.*	Duiker sp.		Forest	T	Herbivore	0		84	26	13
Cetartiodactyla	Cephalophinae	*Cephalophus zebra*	Zebra duiker	NT	Forest	T	Herbivore	14		195	51	14
Cetartiodactyla	Cephalophinae	*Philantomba maxwelli*	Maxwell's duiker	LC	Woodland	T	Herbivore	3		339	84	19
Cetartiodactyla	Suidae	*Potamochoerus porcus*	Red River Hog	LC	Mixed	T	Omnivore	53		36	3	2
Cetartiodactyla	Tragulidae	*Hyemoschus aquaticus*	Water Chevrotain	LC	Forest	SA	Herbivore	11		24	7	2
Pholidota	Manidae	*Phataginus tricuspis*	White-bellied pangolin	VU	Forest	T	Insectivore	2.5		9	3	3
Pholidota	Manidae	*Smutsia gigantea*	Giant pangolin	VU	Forest	T	Insectivore	32		15	3	3
Primates	Cercopithecidae	*Cercocebus atys*	Sooty Mangabey	VU	Forest	G	Frugivore	8		944	158	25
Primates	Cercopithecidae	*Cercopithecus campbelli*	Campbell's monkey	LC	Woodland	Ar	Herbivore	3.5		12	4	2
Primates	Cercopithecidae	*Cercopithecus diana*	Diana monkey	VU	Forest	Ar	Herbivore	4.5		3	1	1
Primates	Hominidae	*Pan troglodytes verus*	Western Chimpanzee	EN	Forest	T	Insectivore	50		18	5	5
Proboscidea	Elephantidae	*Loxodonta africana cyclotis*	African forest elephant	VU	Forest	T	Herbivore	1000		51	3	3

SAPO NATIONAL PARK - LIBERIA

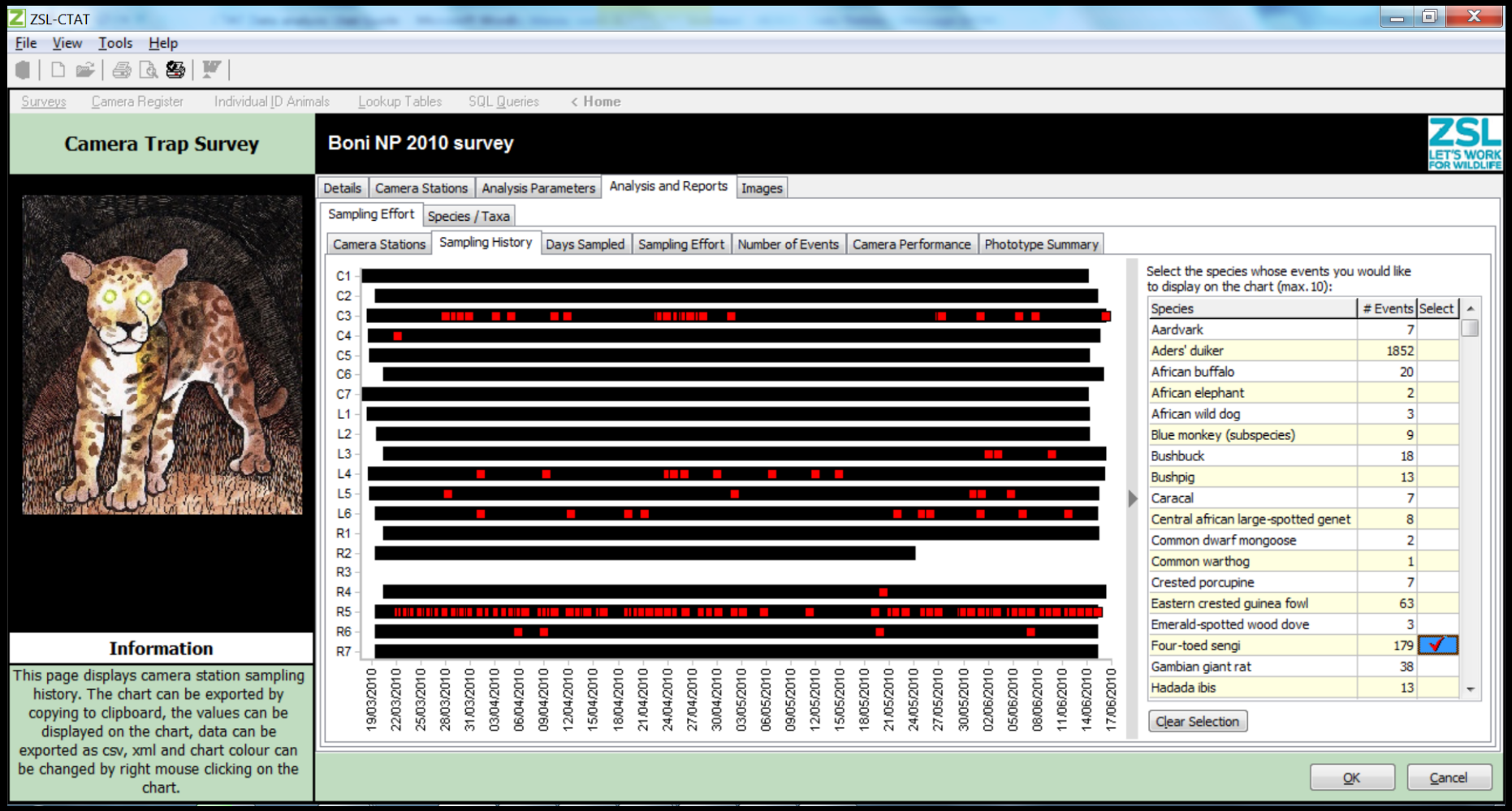
SPECIES ACCUMULATION AND RICHNESS CURVES



AUTOMATICALLY LAUNCHES 'R' TO RUN CALCULATION

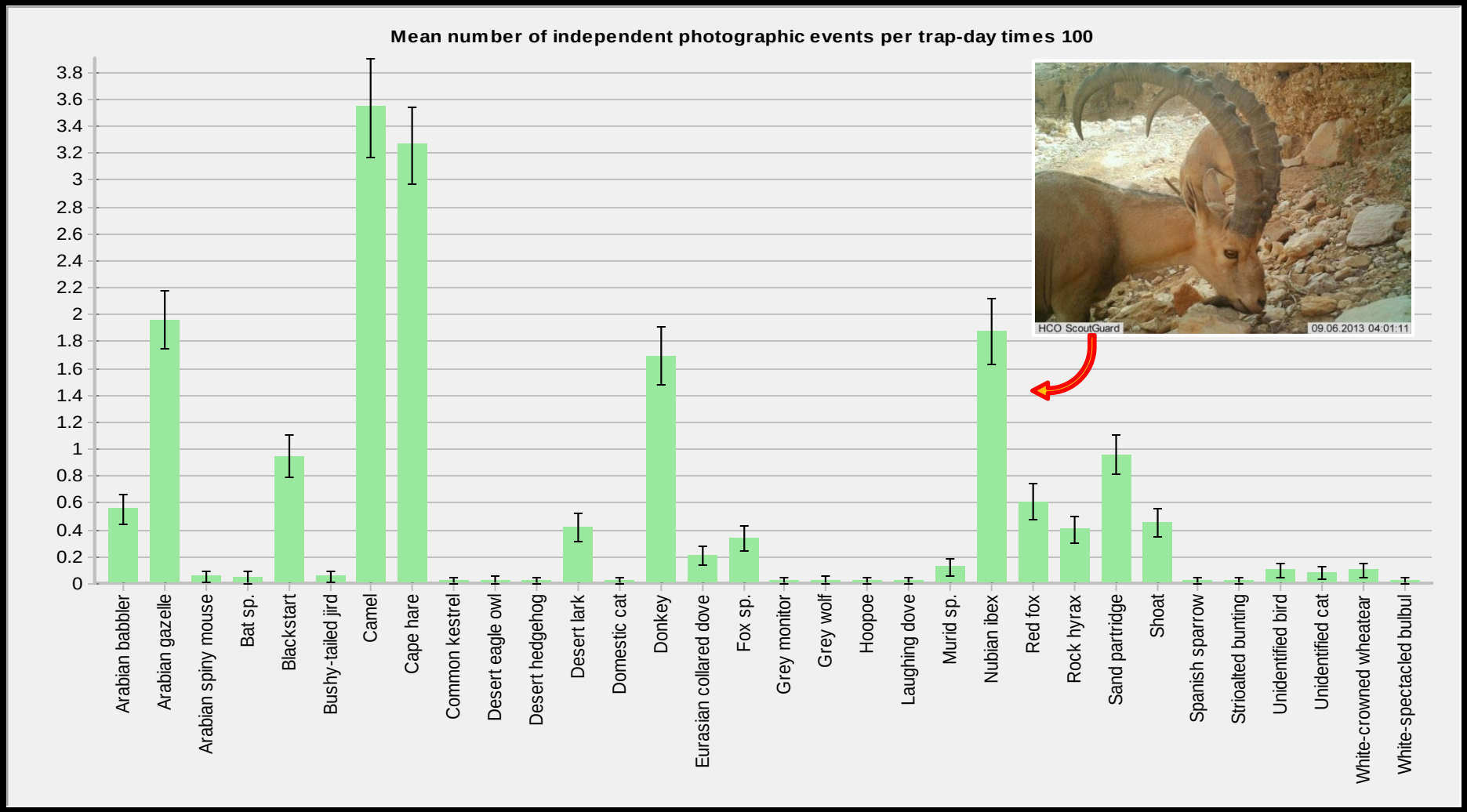
Or export processed data e.g to EstimateS - Colwell 2013

SPATIO-TEMPORAL PLOTS



FOUR-TOED SENGI : ARABUKO-SOKOKE FOREST, KENYA

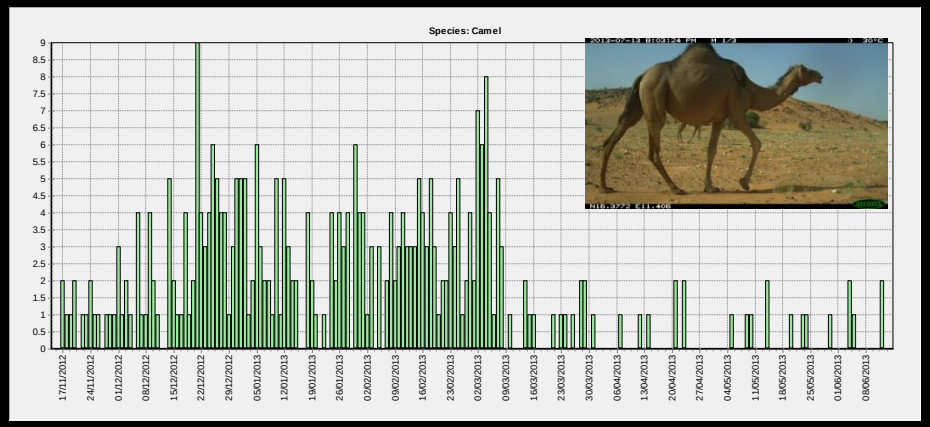
TRAPPING RATES



WADI NUKHAYLAN : IBEX RESERVE, SAUDI ARABIA

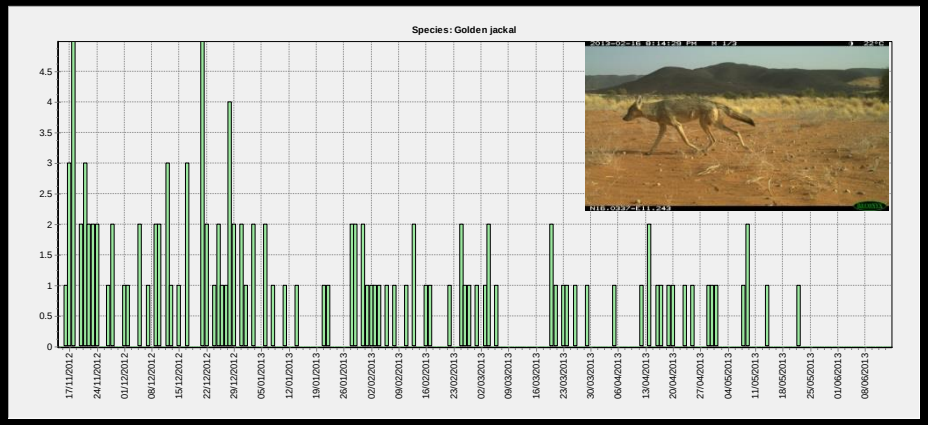
DATA EXPLORATION: TEMPORAL SEQUENCES

TERMIT - NIGER
Nov.12 to Jun 13

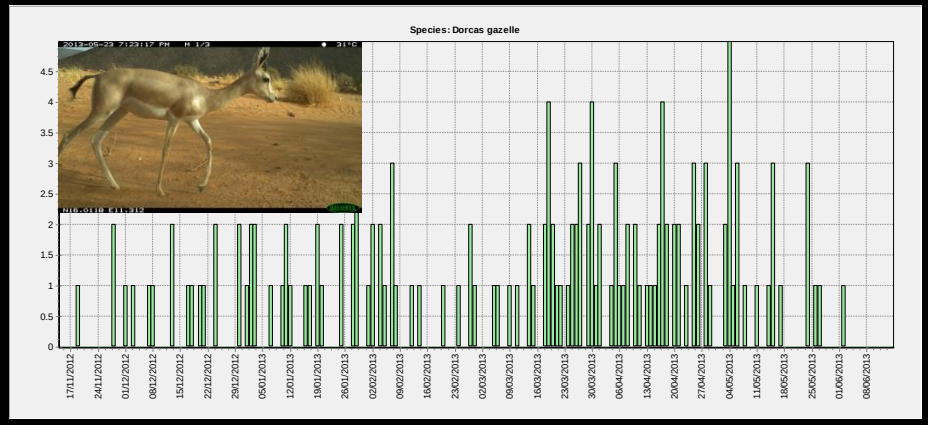


EVENT FREQUENCY BY DATE

CAMELS
Nov.12 to Jun 13



GOLDEN JACKAL
Nov.12 to Jun 13



DORCAS GAZELLE
Nov.12 to Jun 13

OCCUPANCY MODELLING

Surveys | Camera Register | Individual ID Animals | Lookup Tables | SQL Queries | < Home

Camera Trap Survey

Information

This page displays occupancy estimates of each species detected in the survey. The data can be saved as a comma or tab separated text file, xml file, webpage by right mouse clicking on the table. Further information about the occupancy analysis can be obtained by clicking one of the help icons, above.

Boni NP 2010 survey

Details | Camera Stations | Analysis Parameters | Analysis and Reports | Images

Sampling Effort | Species / Taxa

List | Richness | Events per Day | Trapping Rate | Occupancy | Distribution | Activity Pattern

Without Covariates | With Covariates

Species	Avg. Home Range (km²)	No. of Events	Occupancy					Detection Probability				Model Fit		Display Criteria				
			Naïve Estimate	Modelled Estimate	Standard Error	Lower 95% CI	Upper 95% CI	Modelled Estimate	Standard Error	Lower 95% CI	Upper 95% CI	AIC	Log Like	A	B	C	D	E
Aardvark		7	0.316	0.993	0.226	0.316	1.0	0.045	0.019	0.019	0.102	61.32	57.32					
Aders' duiker		1852	1.0	1.0	0.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0	0.0					
African buffalo		20	0.105	0.107	0.071	0.105	0.342	0.406	0.123	0.201	0.65	39.765	35.765					
African elephant		2	0.105	-	-	-	-	-	-	-	-	-	-					
African wild dog		3	0.105	-	-	-	-	-	-	-	-	-	-					
Blue monkey (subspecies)		9	0.316	0.651	0.377	0.316	0.98	0.077	0.05	0.021	0.248	66.864	62.864					
Bushbuck		18	0.158	0.176	0.095	0.158												
Bushpig		13	0.526	1.0	0.016	0.526												
Caracal		7	0.526	-	-	-												
Central african large-spotted genet		8	0.368	0.999	0.055	0.368												
Common dwarf mongoose		2	0.368	-	-	-												
Common warthog		1	0.368	-	-	-												
Crested porcupine		7	0.105	0.107	0.072	0.105												
Eastern crested guinea fowl		63	0.789	0.816	0.098	0.789												
Emerald-spotted wood dove		3	0.789	-	-	-												
Four-toed sengi		179	0.474	0.477	0.115	0.474												
Gambian giant rat		38	0.526	0.564	0.125	0.526												
Hadada ibis		13	0.526	-	-	-												
Harvey's duiker		90	0.684	0.699	0.109	0.684												
Honey badger		4	0.684	-	-	-												
Leopard		20	0.526	0.881	0.296	0.526												
Red-necked francolin		1	0.526	-	-	-												
Sokoke bushy-tailed mongoose		56	0.737	0.786	0.111	0.737												
Spotted hyaena		8	0.263	0.403	0.197	0.263												
Suni		709	0.947	0.947	0.051	0.947												
Yellow baboon		2	0.947	-	-	-												

Calculate... | View on a Chart... | Export Presence-Absence Matrices... | Display Criteria...

Occupancy Display Criteria

Modelled species occupancy estimates can be unreliable if there is not enough species event data. Four related criteria are available below with user selectable values to help highlight this. When any of these criteria are not met, modelled occupancy is not displayed on the chart (only naïve occupancy is displayed) and the failed criteria is highlighted in "Red" in the species occupancy results table:

(A) Naive occupancy >= 0.1

(B) Number of events >= 10

(C) Modelled detection probability >= 0.1

(D) Modelled occupancy 95% confidence interval "CI" < 0.75

OK | Defaults | Cancel

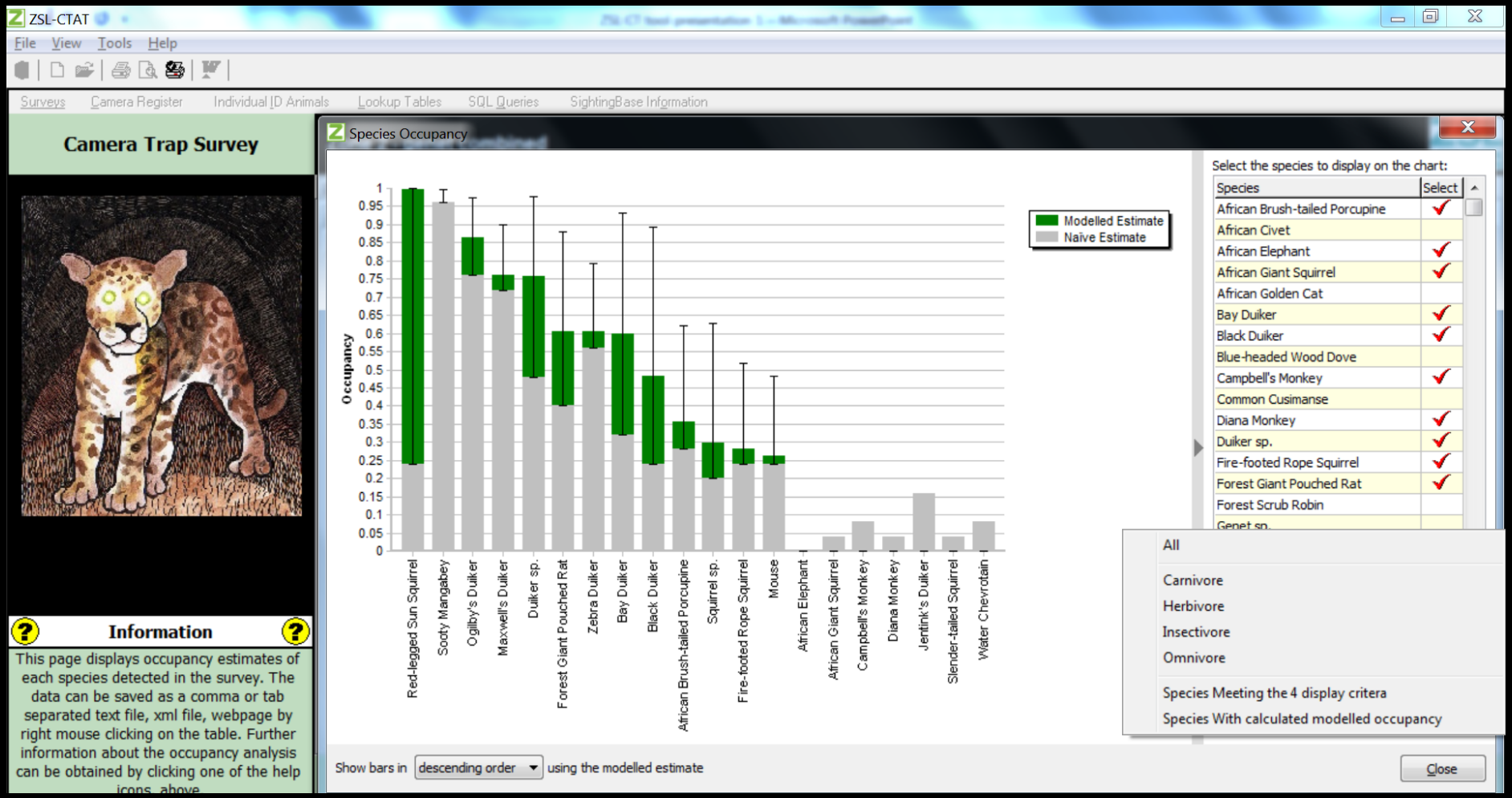
OK | Cancel

12:09 08/03/2017

SELECTED MAMMALS : BONI FOREST, KENYA

Note: Presence/absence matrices exportable for separate analysis

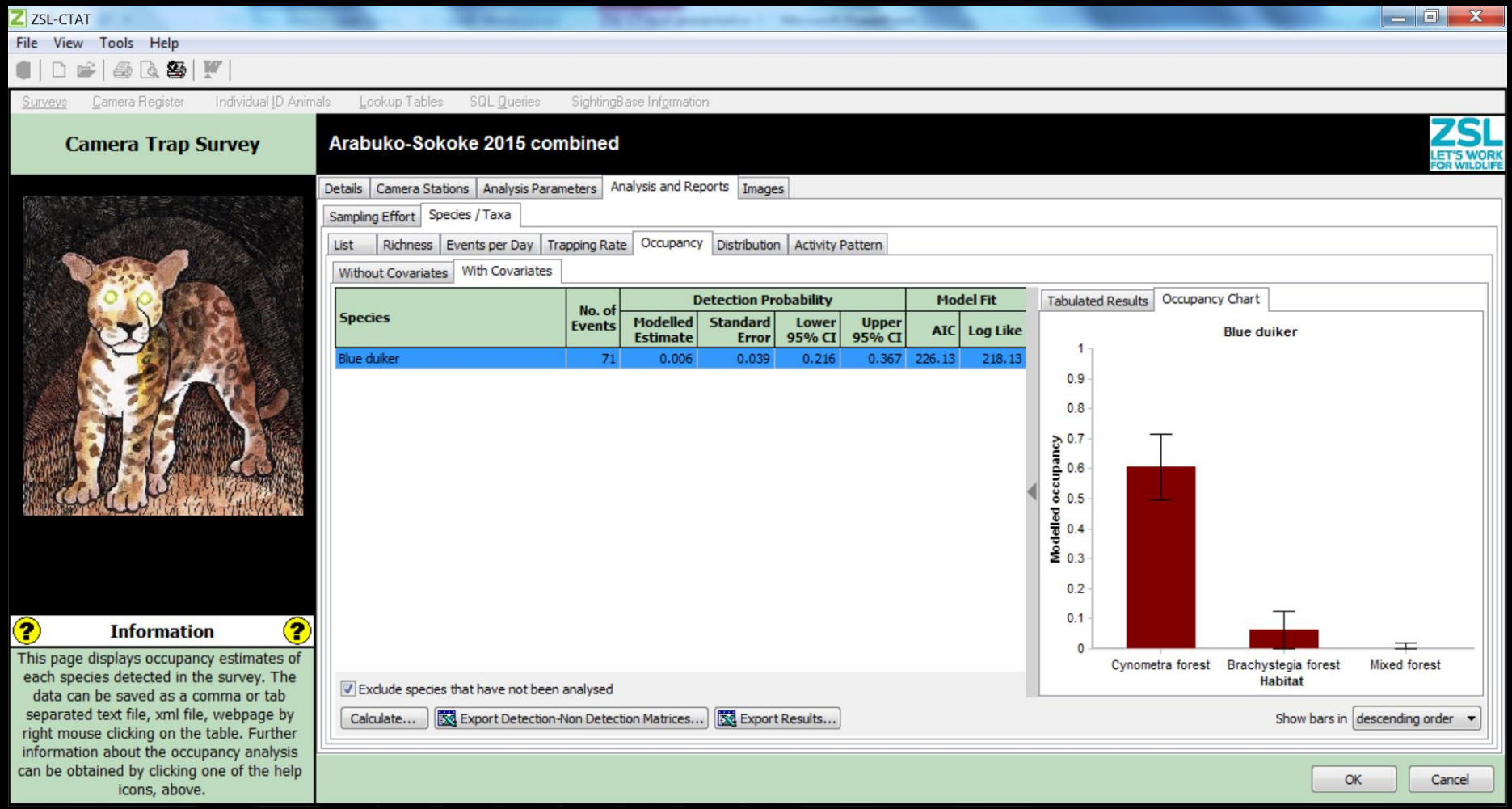
OCCUPANCY MODELLING: GRAPHIC OUTPUT



SELECTED MAMMALS : SAPO NP, LIBERIA

Automatically launches 'R' to run calculations

OCCUPANCY MODELLING WITH SITE COVARIATES

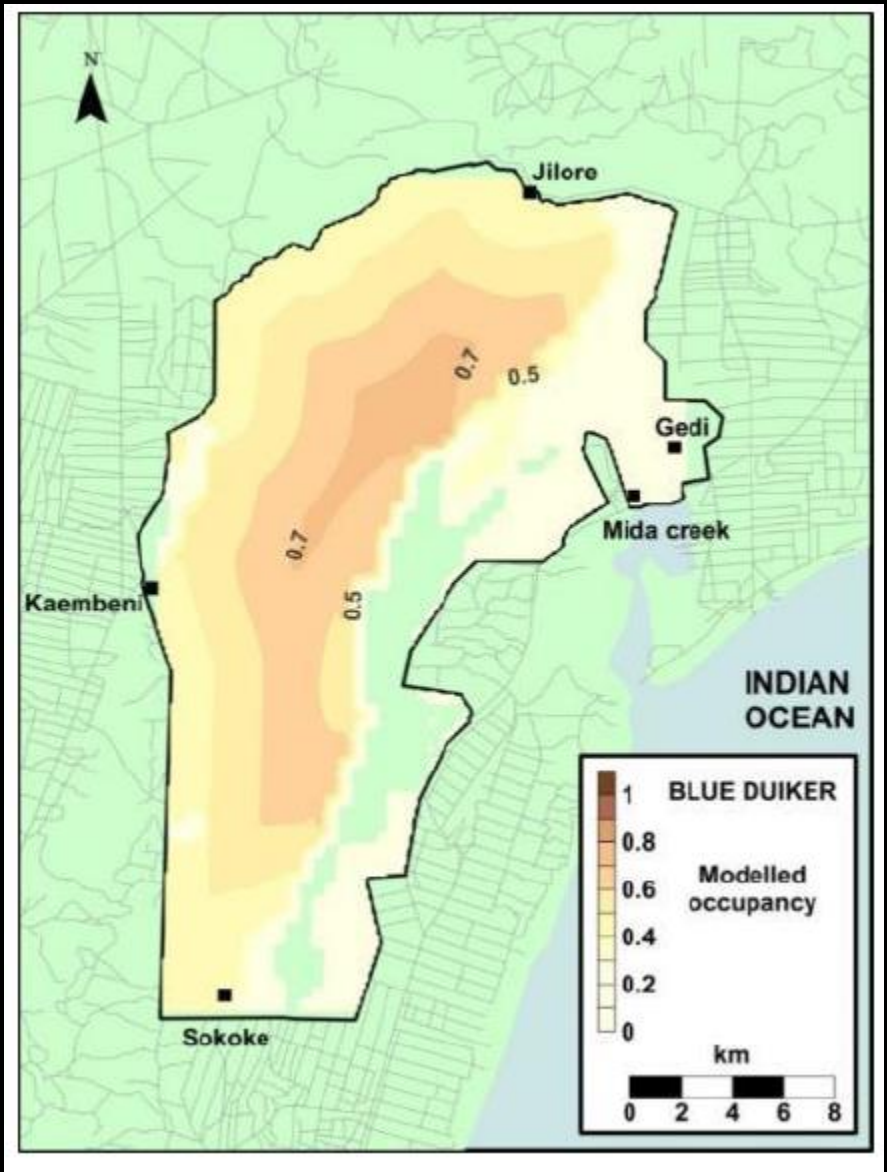


BLUE DUIKER : ARABUKO-SOKOKE FOREST, KENYA

OCCUPANCY MODELLING WITH SITE COVARIATES

BLUE DUIKER : ARABUKO-SOKOKE FOREST, KENYA

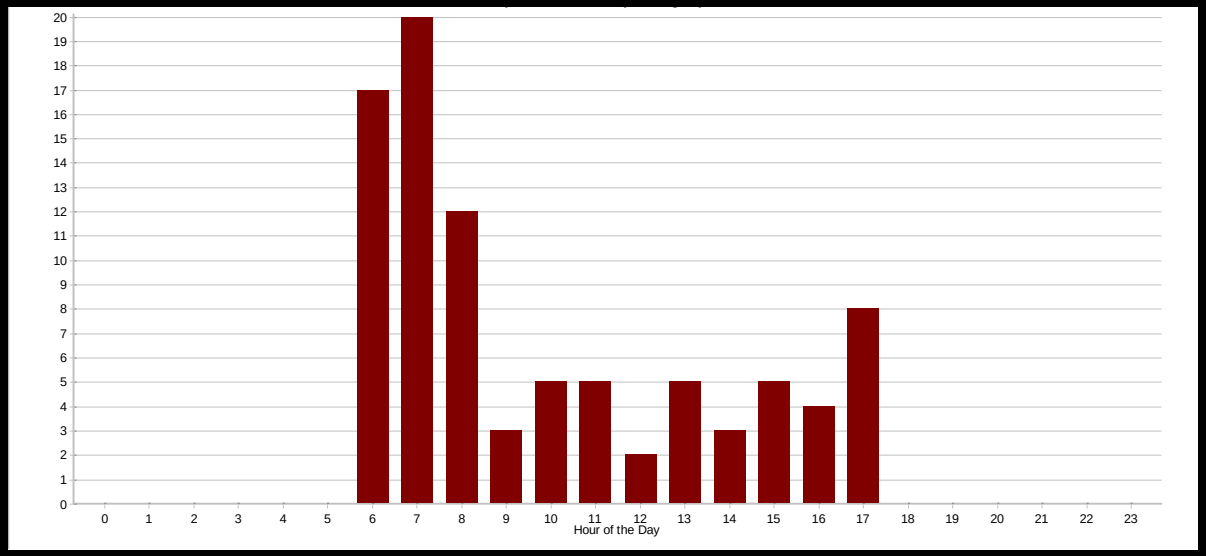
Occurrence map



Plot results of occupancy modelling: Blue duiker *Philantomba monticola* occurrence map, Arabuko-Sokoke Forest Reserve, Kenya.

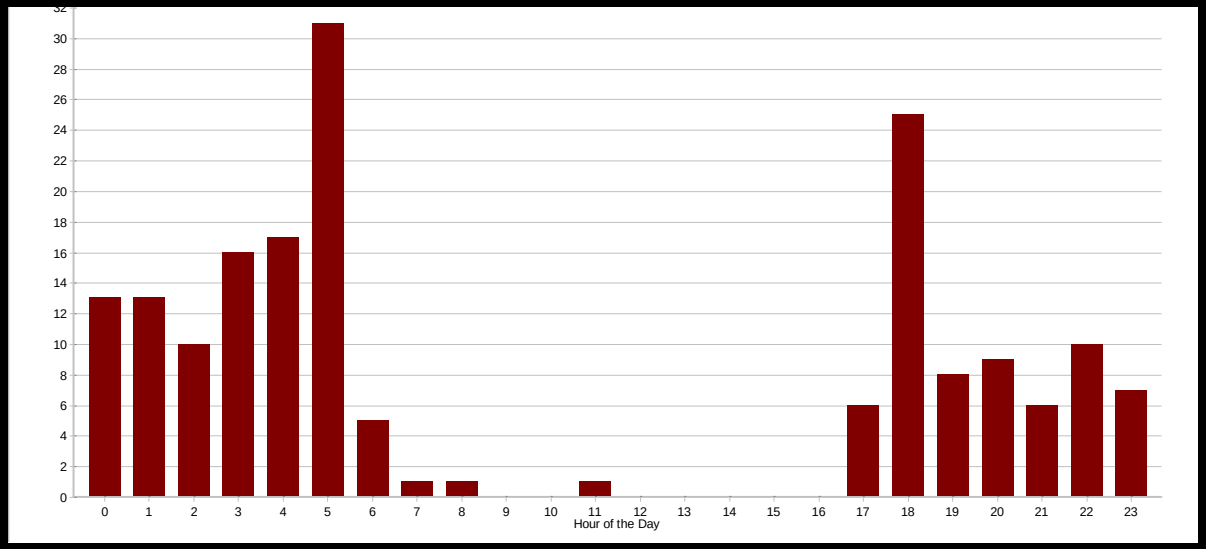
ACTIVITY PATTERNS

GIANT SENGI

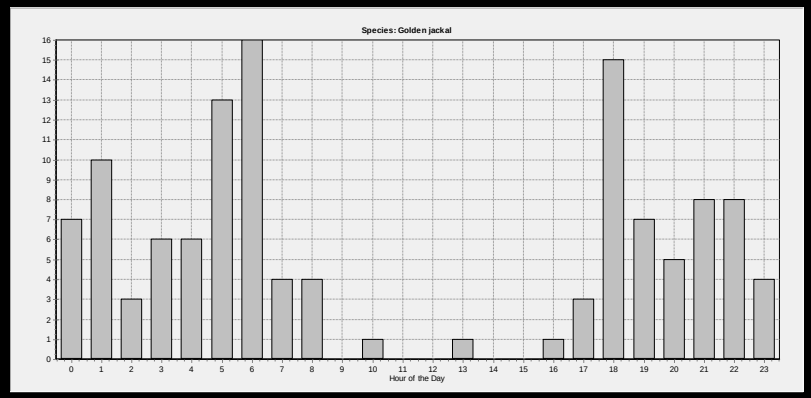


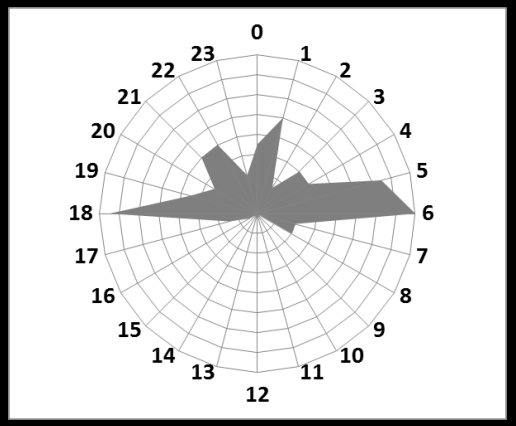
Mar – Jun 2010

FOUR-TOED SENGI

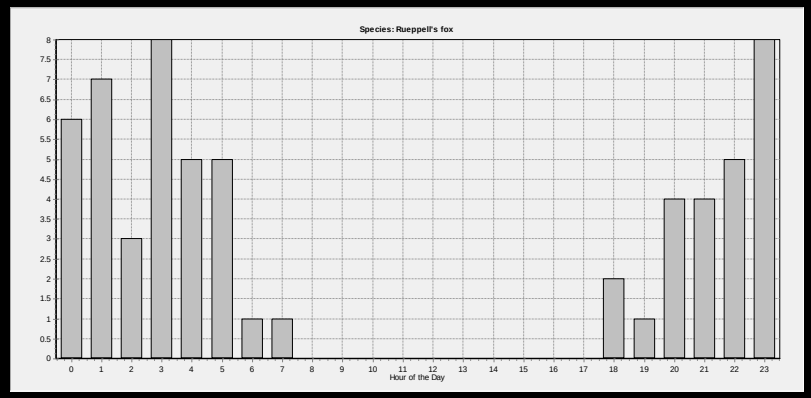


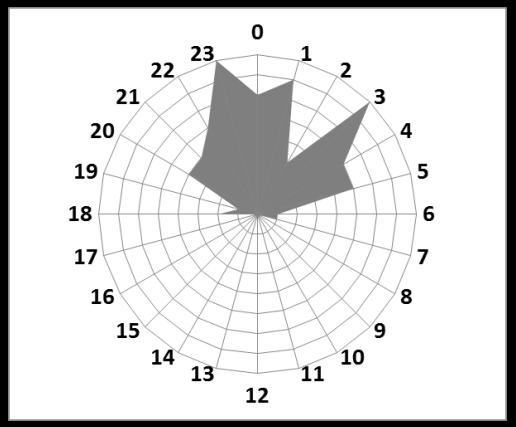
ACTIVITY PATTERNS





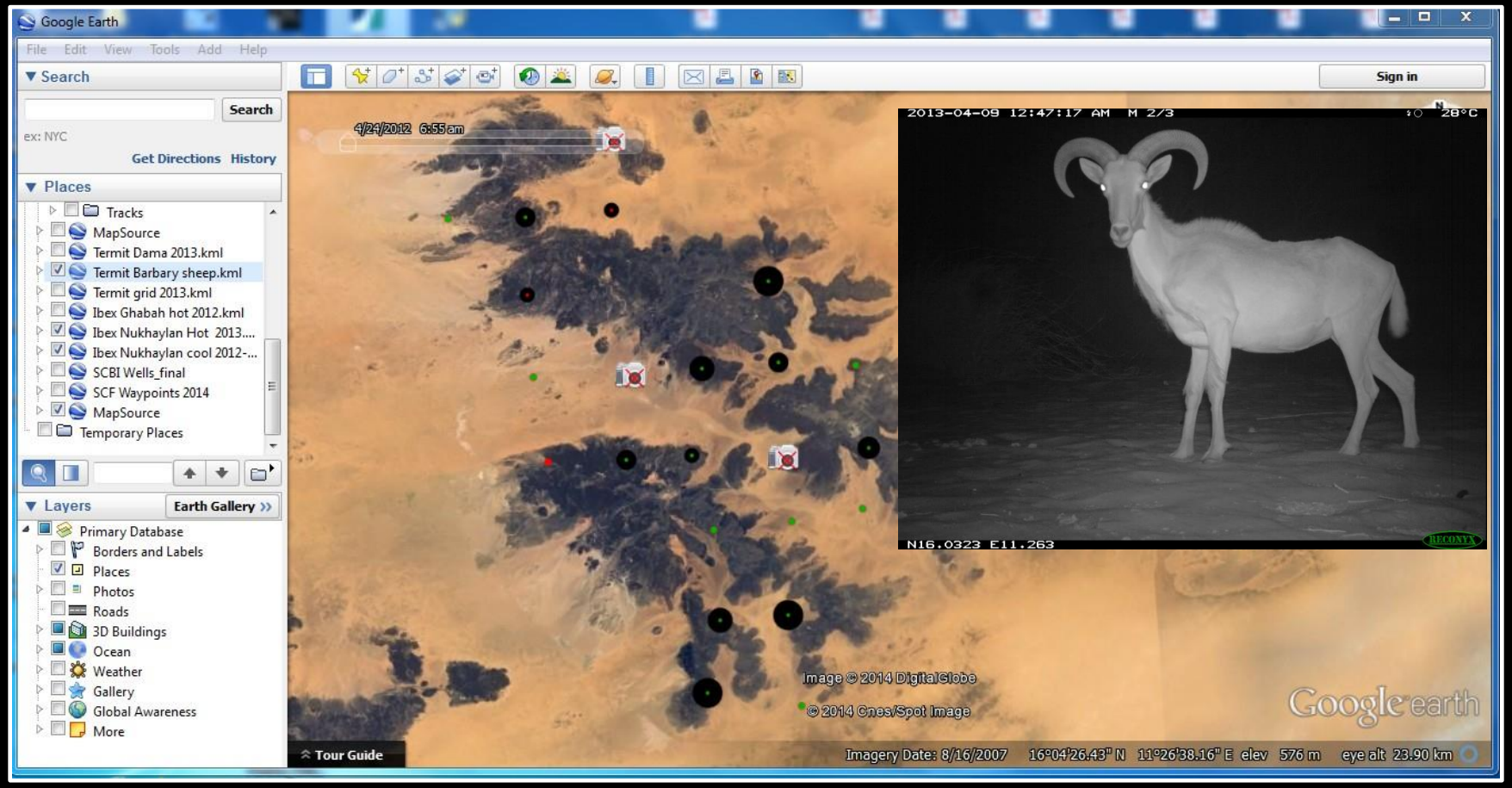
African ‘golden wolf’





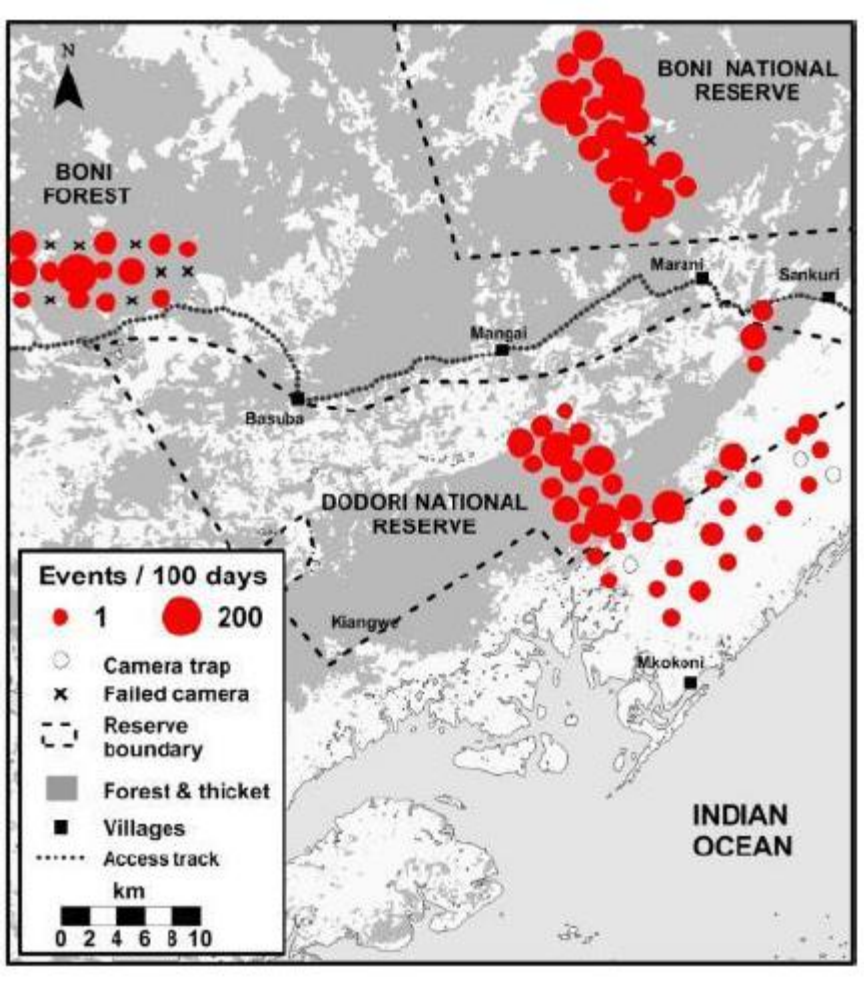
Ruppell’s fox

DISTRIBUTION OF RECORDS
Google Earth (QGIS & ArcReader)



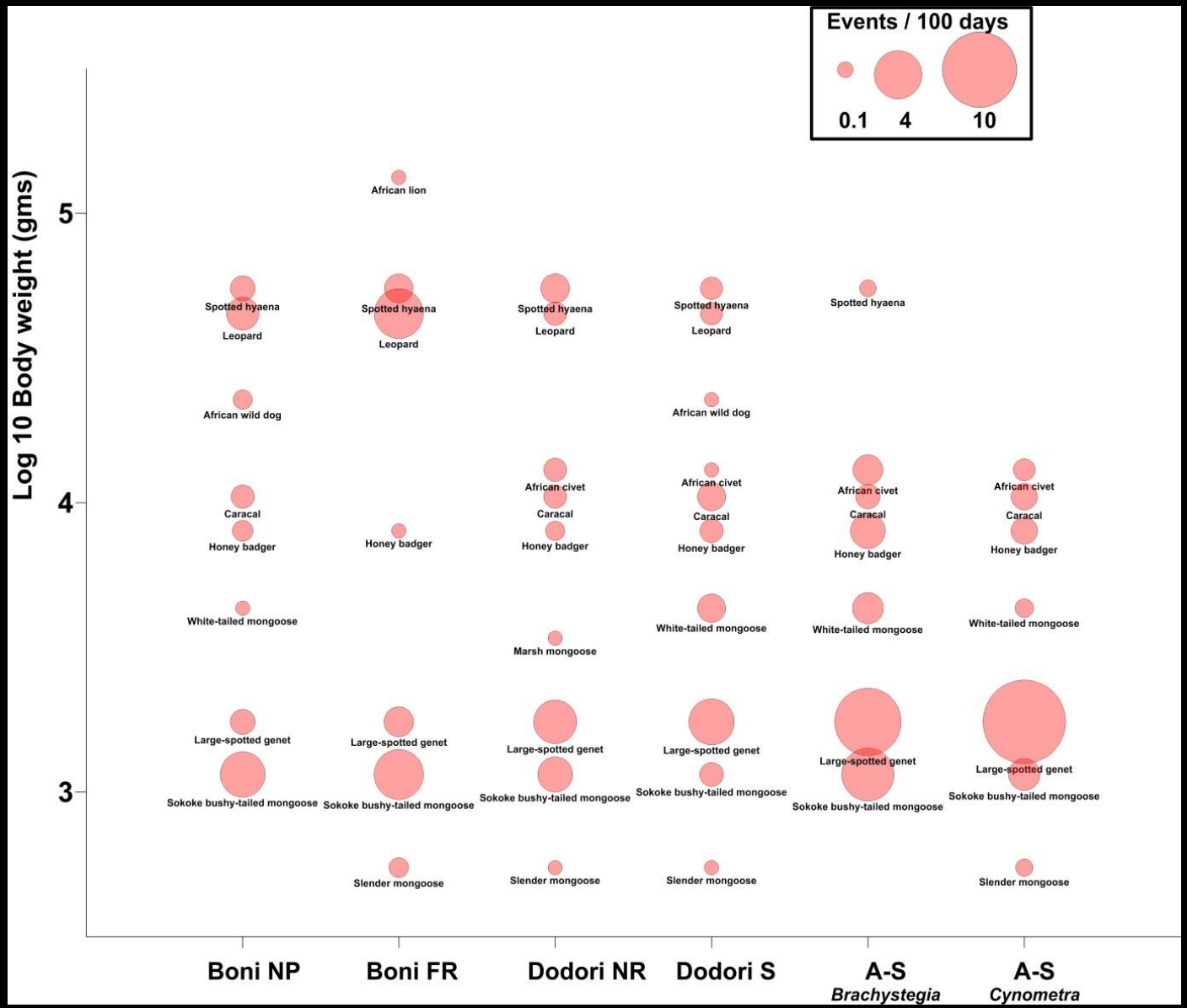
AUTOMATIC INTERFACE WITH GOOGLE EARTH
BARBARY SHEEP – TERMIT

DISTRIBUTION OF RECORDS



Spatial plot of trapping rates for any selected species; viewed through QGIS; Aders' duiker *Cephalophus adersi*, Boni-Dodori forest system, coastal Kenya.

Community plots



DATA PREPARATION

5 DATA INPUTS:

1. CAMERA LOCATION AND SITE COVARIATES
2. CAMERA MAKE & CONFIGURATION DETAILS
3. CAMERA SETUP, SERVICE & RECOVERY DATES
4. IMAGE DATA
5. SITE COVARIATES (optional)

1 - IMAGE DATA

META-DATA EXTRACTION

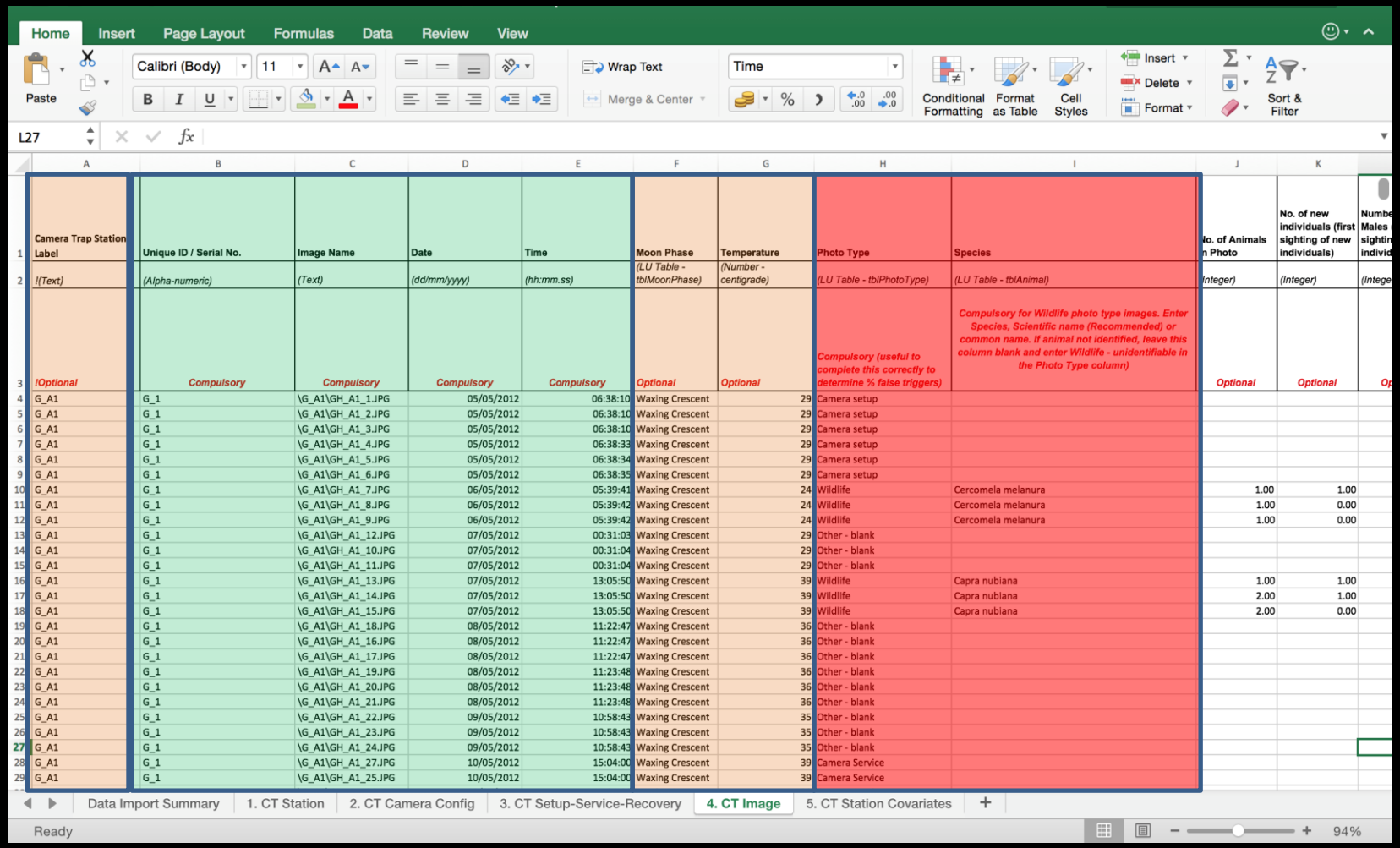
1 - IMAGE DATA

META-DATA EXTRACTION

DATA STANDARDISATION

- STANDARD 'PHOTO TYPE' CLASSES
- EXTENSIVE USE OF LOOK-UP TABLES IN THE DATA MODEL (FIXED AND EDITABLE COMPONENTS)
- SPECIES NAMES BASED ON IUCN REDLIST
- SEPARATE 'COUNTRY TEMPLATES' FOR SPECIES

1. IMAGE DATA



	Camera Trap Station Label	Unique ID / Serial No.	Image Name	Date	Time	Moon Phase	Temperature	Photo Type	Species	No. of Animals in Photo	No. of new individuals (first sighting of new individuals)	Number Males (first sighting of new individuals)
2	!(Text)	(Alpha-numeric)	(Text)	(dd/mm/yyyy)	(hh:mm.ss)	(LU Table - tblMoonPhase)	(Number - centigrade)	(LU Table - tblPhotoType)	(LU Table - tblAnimal)	(Integer)	(Integer)	(Integer)
3	!Optional	Compulsory	Compulsory	Compulsory	Compulsory	Optional	Optional	Compulsory (useful to complete this correctly to determine % false triggers)	Compulsory for Wildlife photo type images. Enter Species, Scientific name (Recommended) or common name. If animal not identified, leave this column blank and enter Wildlife - unidentifiable in the Photo Type column)	Optional	Optional	Optional
4	G_A1	G_1	\G_A1\GH_A1_1.JPG	05/05/2012	06:38:10	Waxing Crescent	29	Camera setup				
5	G_A1	G_1	\G_A1\GH_A1_2.JPG	05/05/2012	06:38:10	Waxing Crescent	29	Camera setup				
6	G_A1	G_1	\G_A1\GH_A1_3.JPG	05/05/2012	06:38:10	Waxing Crescent	29	Camera setup				
7	G_A1	G_1	\G_A1\GH_A1_4.JPG	05/05/2012	06:38:33	Waxing Crescent	29	Camera setup				
8	G_A1	G_1	\G_A1\GH_A1_5.JPG	05/05/2012	06:38:34	Waxing Crescent	29	Camera setup				
9	G_A1	G_1	\G_A1\GH_A1_6.JPG	05/05/2012	06:38:35	Waxing Crescent	29	Camera setup				
10	G_A1	G_1	\G_A1\GH_A1_7.JPG	06/05/2012	05:39:41	Waxing Crescent	24	Wildlife	Cercomela melanura	1.00	1.00	
11	G_A1	G_1	\G_A1\GH_A1_8.JPG	06/05/2012	05:39:42	Waxing Crescent	24	Wildlife	Cercomela melanura	1.00	0.00	
12	G_A1	G_1	\G_A1\GH_A1_9.JPG	06/05/2012	05:39:42	Waxing Crescent	24	Wildlife	Cercomela melanura	1.00	0.00	
13	G_A1	G_1	\G_A1\GH_A1_12.JPG	07/05/2012	00:31:03	Waxing Crescent	29	Other - blank				
14	G_A1	G_1	\G_A1\GH_A1_10.JPG	07/05/2012	00:31:04	Waxing Crescent	29	Other - blank				
15	G_A1	G_1	\G_A1\GH_A1_11.JPG	07/05/2012	00:31:04	Waxing Crescent	29	Other - blank				
16	G_A1	G_1	\G_A1\GH_A1_13.JPG	07/05/2012	13:05:50	Waxing Crescent	39	Wildlife	Capra nubiana	1.00	1.00	
17	G_A1	G_1	\G_A1\GH_A1_14.JPG	07/05/2012	13:05:50	Waxing Crescent	39	Wildlife	Capra nubiana	2.00	1.00	
18	G_A1	G_1	\G_A1\GH_A1_15.JPG	07/05/2012	13:05:50	Waxing Crescent	39	Wildlife	Capra nubiana	2.00	0.00	
19	G_A1	G_1	\G_A1\GH_A1_18.JPG	08/05/2012	11:22:47	Waxing Crescent	36	Other - blank				
20	G_A1	G_1	\G_A1\GH_A1_16.JPG	08/05/2012	11:22:47	Waxing Crescent	36	Other - blank				
21	G_A1	G_1	\G_A1\GH_A1_17.JPG	08/05/2012	11:22:47	Waxing Crescent	36	Other - blank				
22	G_A1	G_1	\G_A1\GH_A1_19.JPG	08/05/2012	11:23:48	Waxing Crescent	36	Other - blank				
23	G_A1	G_1	\G_A1\GH_A1_20.JPG	08/05/2012	11:23:48	Waxing Crescent	36	Other - blank				
24	G_A1	G_1	\G_A1\GH_A1_21.JPG	08/05/2012	11:23:48	Waxing Crescent	36	Other - blank				
25	G_A1	G_1	\G_A1\GH_A1_22.JPG	09/05/2012	10:58:43	Waxing Crescent	35	Other - blank				
26	G_A1	G_1	\G_A1\GH_A1_23.JPG	09/05/2012	10:58:43	Waxing Crescent	35	Other - blank				
27	G_A1	G_1	\G_A1\GH_A1_24.JPG	09/05/2012	10:58:43	Waxing Crescent	35	Other - blank				
28	G_A1	G_1	\G_A1\GH_A1_27.JPG	10/05/2012	15:04:00	Waxing Crescent	39	Camera Service				
29	G_A1	G_1	\G_A1\GH_A1_25.JPG	10/05/2012	15:04:00	Waxing Crescent	39	Camera Service				

1) LOAD META DATA FOR EACH CAMERA SEQUENTIALLY :

2) ENTER PHOTO TYPE & SPECIES BY HAND (MUST MATCH LOOK-UP TABLE OPTIONS)

2. CAMERA SITE NAME, POSITION, SITE VARIABLES

	A	B	C	D	E	F	G	H	I	J	K
1	Camera Trap Station Label	Latitude / UTM Northing (planned)	Longitude / UTM Easting (planned)	Latitude / UTM Northing (actual)	Longitude / UTM Easting (actual)	Habitat	Habitat Remarks	Altitude	Aspect	Terrain	Slope
2	*!(Text)*	*(Real number / Lo*	*(Real number / Lo*	*(Real numbr / Lo*	*(Real number / Long*	*(LU Table - tblHabitat)*	*(Text)*	*(Integer - meters)*	*(LU Table - tblAspect)*	*(LU Table - tblTerrain)*	*(Real number)*
3	*!Compulsory*	*Optional*	*Optional*	*Compulsory*	*Compulsory*	*Optional*	*Optional*	*Optional*	*Optional*	*Optional*	*Optional*
4	B1	9635000	599000	9635001	599013	Cynometra forest					
5	B2	9635000	601000	9635059	601086	Brachystegia forest					
6	B3	9633000	599000	9632897	598965	Brachystegia forest					
7	B4	9633000	601000	9633008	601012	Mixed forest					
8	B5	9633000	603000	9632960	603025	Brachystegia forest					
9	B6	9631000	599000	9631068	599011	Brachystegia forest					
10	B7	9631000	601000	9630997	601002	Brachystegia forest					
11	B8	9629000	597000	9629000	597000	Brachystegia forest					
12	B9	9629000	599000	9629000	599000	Brachystegia forest					
13	B10	9627000	597000	9627040	597027	Cynometra forest					
14	B11	9627000	599000	9626977	599009	Brachystegia forest					
15	B12	9625000	597000	9625000	597000	Cynometra forest					
16	B13	9625000	599000	9624971	598990	Brachystegia forest					
17	B14	9625000	601000	9625022	600946	Brachystegia forest					
18	B15	9623000	597000	9622951	597042	Brachystegia forest					
19	B16	9623000	599000	9622971	599030	Brachystegia forest					
20	B17	9621000	597000	9621024	597090	Brachystegia forest					
21	B18	9621000	599000	9621002	599047	Brachystegia forest					
22	B19	9619000	595000	9618912	594966	Brachystegia forest					
23	B20	9619000	597000	9618931	597026	Brachystegia forest					

Data Import Summary | **1. CT Station** | 2. CT Camera Config | 3. CT Setup-Service-Recovery | 4. CT Image | 5. CT Station Covariates

Ready 100%

3. CAMERA CONFIGURATION

	A	B	C	D	E	F	G	H	I	J	K	L
1	Camera Make	Camera Model	Purchase Date	Unique ID / Serial No.	Trigger Speed	Period Between Triggers	Images/ Trigger	Trigger Mode	Photo Interval	Image Resolution	Flash Mode	Camera Sensitivity
2	!			*User defined or from manufacturer (documentation/ sometimes in image meta data).*		*Length of quiet period after a trigger*	*Images per trigger*		*Length of time between pictures within a trigger event*			
3	!(LU Table - tblCar	(LU Table - tblCa	(Date)	(Alpha-numeric)	(Real number e.g. 0.2 secs	(Integer - secs)	(Integer)	(LU Table - tblTriggerMod	(Real number: secs)	(Long)	(LU Table - tblFlas	(LU Table - tblCame
4	*!Optional*	*Optional*	*Optional*	*Compulsory*	*Optional*	*Optional*	*Optional*	*Optional*	*Optional*	*!Optional*	*Compulsory*	*Optional*
5	Bushnell	Trophy		B001			3	Active			Infrared	High
6	Bushnell	Trophy		B002			3	Active			Infrared	High
7	Bushnell	Trophy		B003			3	Active			Infrared	High
8	Bushnell	Trophy		B004			3	Active			Infrared	High
9	Bushnell	Trophy		B005			3	Active			Infrared	High
10	Bushnell	Trophy		B006			3	Active			Infrared	High
11	Bushnell	Trophy		B007			3	Active			Infrared	High
12	Bushnell	Trophy		B008			3	Active			Infrared	High
13	Bushnell	Trophy		B009			3	Active			Infrared	High
14	Bushnell	Trophy		B010			3	Active			Infrared	High
15	Bushnell	Trophy		B011			3	Active			Infrared	High
16	Bushnell	Trophy		B012			3	Active			Infrared	High
17	Bushnell	Trophy		B013			3	Active			Infrared	High
18	Bushnell	Trophy		B014			3	Active			Infrared	High
19	Bushnell	Trophy		B015			3	Active			Infrared	High

Data Import Summary | 1. CT Station | 2. CT Camera Config | 3. CT Setup-Service-Recovery | 4. CT Image | 5. CT Station Covariates

Ready 95%

4. SET-UP, SERVICE, RECOVERY & FUNCTIONING HISTORIES

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Camera Trap Station Label	Unique ID / Serial No	Setup/Service /Recovery Date	Setup/Service /Recovery Time	Service Type	Status	Date Camera Starting Operating	Time Camera Starting Operating	Date Camera Stopped Operating	Time Camera Stopped Operating	Direction	Bait Type	Paired	Mounting
2	!Compulsory	Compulsory	Compulsory	Complusory	Compulsory	Optional	Use these fields if you wish to directly control the exact start time of sample period following set up (or a post service set up) of a camera; Leaving blank will result in automatic selection of the first picture at or following set up date in column C & D.		Use these fields if you wish to directly control the exact finish time of sample period in relation to camera recovery (or service time); Leaving blank will result in automatic selection of the last image at or prior to recovery date time in C & D.		Optional	Optional	Compulsory	Optional
3	B1	B001	29/05/2015	17:36:38	Setup	Working	29/05/2015	17:36:38					No	
4	B1	B001	07/12/2015	13:27:52	Service	Not Working	07/12/2015	13:27:52	15/09/2015	12:14:43			No	
5	B1	B001	26/04/2016	13:10:44	Recovery	Working			26/04/2016	13:10:44			No	
6	B2	B002	26/05/2015	06:08:20	Setup	Working	26/05/2015	06:12:57					No	
7	B2	B002	07/12/2015	11:50:19	Service	Working	07/12/2015	13:02:50	07/12/2015	11:50:19			No	
8	B2	B002	26/04/2016	12:49:27	Recovery	Working			26/04/2016	12:49:27			No	
9	B3	B003	26/05/2015	09:50:13	Setup	Working	26/05/2015	09:50:13					No	
10	B3	B003	07/12/2015	11:26:54	Service	Working	07/12/2015	12:44:51	07/12/2015	11:26:54			No	
11	B3	B003	26/04/2016	12:21:01	Recovery	Working			26/04/2016	12:21:01			No	
12	B4	B004	26/05/2015	07:36:41	Setup	Working	31/05/2015	13:10:09					No	
13	B4	B004	07/12/2015	12:22:00	Service	Working	07/12/2015	12:26:38	07/12/2015	12:22:00			No	
14	B4	B004	26/04/2016	12:04:05	Recovery	Working			26/04/2016	12:04:05			No	
15	B5	B005	26/05/2015	17:23:04	Setup	Working	26/05/2015	17:23:04					No	
16	B5	B005	07/12/2015	10:48:47	Service	Working	07/12/2015	12:01:51	07/12/2015	10:48:47			No	
17	B5	B005	26/04/2016	11:42:12	Recovery	Working			26/04/2016	11:42:12			No	
18	B6	B006	26/05/2015	16:52:38	Setup	Working	26/05/2015	16:54:34					No	
19	B6	B006	07/12/2015	11:43:22	Service	Working	07/12/2015	11:43:22	07/12/2015	11:43:22			No	
20	B6	B006	25/04/2016	10:09:46	Recovery	Working			25/04/2016	10:09:46			No	
21	B7	B007	29/05/2015	18:06:55	Setup	Working	29/05/2015	18:06:55					No	
22	B7	B007	06/12/2015	07:51:06	Service	Working	06/12/2015	09:10:26	06/12/2015	07:51:06			No	
23	B7	B007	24/04/2016	05:44:00	Recovery	Not Working			23/02/2016	06:43:36			No	
24	B8	B008	26/05/2015	08:25:13	Setup	Working	26/05/2015	08:33:16					No	
25	B8	B008	06/12/2015	11:26:20	Service	Working	06/12/2015	12:55:09	06/12/2015	11:26:20			No	
26	B8	B008	24/04/2016	12:04:42	Recovery	Working			24/04/2016	12:04:42			No	
27	B9	B009	29/05/2015	16:31:06	Setup	Working	29/05/2015	16:32:26					No	
28	B9	B009	07/12/2015	12:54:38	Service	Working	07/12/2015	14:36:26	07/12/2015	12:54:38			No	

Data Import Summary | 1. CT Station | 2. CT Camera Config | 3. CT Setup-Service-Recovery | 4. CT Image | 5. CT Station Covariates

Ready 70%

DEMONSTRATION

CAMERA TRAPPING NEEDS

1) PROTOCOLS & BEST PRACTICES

2) TRAINING: SURVEY DESIGN & FIELD SET UP

3) TRAINING : DATA MANAGEMENT & ANALYSIS

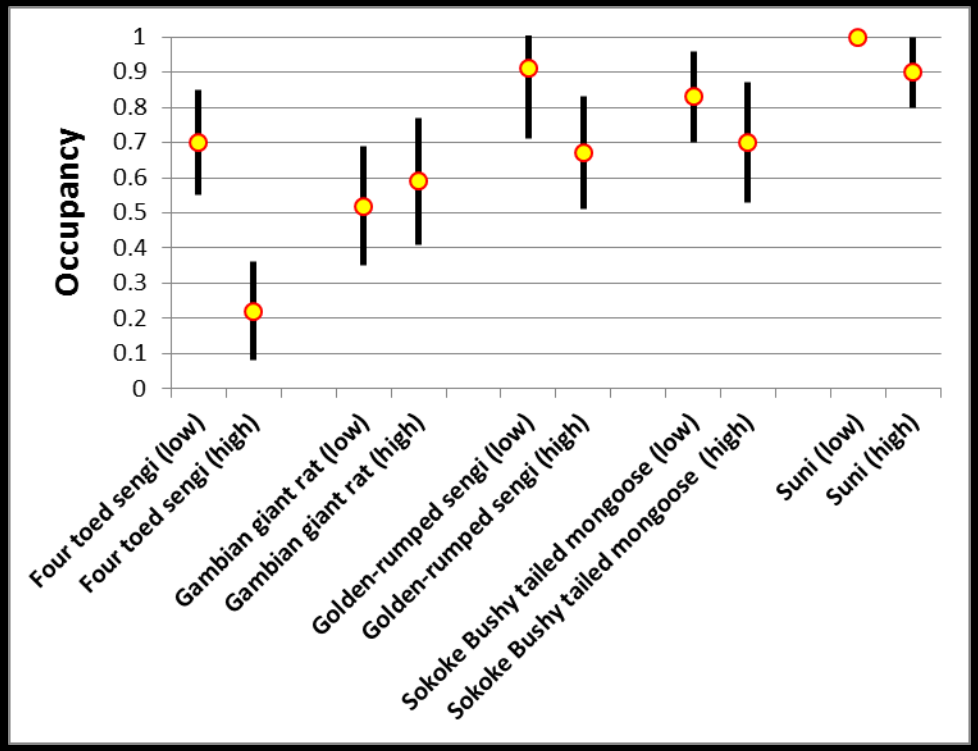
4) DATA ANALYSIS AND REPORTING

IMPACT OF TRAINING

50% OF CAMERAS BEFORE TRAINING

95% OF CAMERAS AFTER TRAINING

STANDARDISING CAMERA POSITION



VERSION 2 DEVELOPMENT

- Image metadata processing tool
- Individual ID animal tool
- Population density estimates for marked animals (spatially explicit capture-recapture modelling)
- Population density estimates for unmarked animals
- Activity level modelling
- Diversity measures
- Species community structure analyses
- Statistical tests (chi-square, circular statistics etc.)
- Cross survey analyses
- Standardised reports generation in Word and RTF.