

SIFAKA DATA MANUAL

Prepared by Marion Schwartz, Alison Richard, and Joelisoa Ratsirarson
August 5, 2014

PREFACE

The purpose of this Manual is to provide methodological and contextual information about the Schwartz Sifaka Life History Database. Part 1 of the Manual focuses on the Database itself, and Part II on how data were collected in the field. Further contextual information is provided in 5 appendices. The overall structure of the Manual is as follows:

Part I: The Schwartz Database

1. The study population
2. Criteria used to record year and date of birth and death, and resolution of data
3. Key to Database Tables
4. Group Location
5. Contributors to the Database and census records used as sources

Part II: Collection of field data

1. Censusing
2. Capture, marking and release
3. Information collected at time of capture
4. Recording the location of individuals and groups
5. Naming individuals and groups

Appendices

1. Location of Bezà Mahafaly Special Reserve
2. Map of the grid system of Parcel I
3. Graphic representation of ear-notch system
4. Capture sheets used since outset of research program
5. History of group names

PART I: THE SCHWARTZ DATABASE

1: THE STUDY POPULATION

The population included in the Database comprises all marked animals in social groups with home ranges partly or completely within the boundaries of Parcel I of the Bezà Mahafaly Special Reserve (Appendix 1).

The Database includes information on over 750 animals captured since 1984, about a third of which have been followed from birth. The proportion of unmarked individuals in the population has declined since the study began, and today most animals >12 months of age are tagged. Unmarked individuals, for the most

part recent immigrants, are not included in the Database. Animals have also been tagged in groups surrounding Parcel I, primarily in order to facilitate group identification. Data on fertility and survivorship of these individuals are included in the Database if they are judged sufficiently complete.

2: DATA ON AGE AND DEATH: CRITERIA AND RESOLUTION

1.) Age

- a) Estimated vs. known ages: animals captured before 2002 of unknown birth year have been assigned a birth year on the basis of tooth wear; from 2002, captures of unknown birth year are described as having no dental wear, light wear, moderate wear, or heavy wear, but not assigned a birth year.
- b) The birth date assigned an animal of known age represents the first time it was seen as an infant, which in many cases was within a few days of its birth. Infants born outside the intense sampling period between mid-July and mid-August – i.e. June, early July, late August, September, and October -- were often not discovered until the monthly census; birth date estimations for these individuals are of lower resolution.
- c) Animals whose age is estimated by tooth wear are arbitrarily assigned a birthdate of July 15th in the estimated year of their birth.
- d) The Schwartz Database supersedes the age class system used earlier in the study by Richard *et al.* (1991 -*Am.J.Phys.Anthropol.* **84**, 307-322), and does not include age estimates derived from that system.

2.) Death

- a.) Very few fresh cadavers of marked animals have been recovered. Such animals are recorded as “dead” in the Master Census (MC) Table. All other presumed deceased Sifaka are declared dead, “ddead” in the MC Table.
- b.) Criteria for “declared dead” differ for males and females. A male last censused in a group living wholly or mostly within the Reserve who has not been seen in any group in or outside the Reserve for a period of two years is declared dead. Males in outer groups are given three years to make an appearance before becoming “ddead” in the Database. Females commonly remain in their natal group or, in the case of those who leave, disperse to neighboring groups or forest adjacent to their natal group. Females are declared dead after not being sighted for one year in the core groups, and two years outside the Reserve.
- c.) On rare occasions, an animal is “resurrected” after not being observed for a number of years. In the main, however, animals stay close enough to home to give us confidence in this system.
- d.) A date of death is assigned to an animal that disappears based on the last sighting of that individual. From 1985 through 1992, censuses were conducted annually, and declared deaths were recorded as occurring on April 15th. From 1993 until 1999, increased frequency of censuses enabled declared deaths to be recorded in the Master Census on two assigned dates annually (April 15th and October 15th), according to the time of last sighting. Starting in 1999, the monthly census was used to provide higher resolution for dates of disappearance. Still, these dates are ‘best guess’ only.

3. KEY TO TABLES

There are two tables in the Database for any particular class of information. All classes include a table with “-original” appended as a suffix to its name. This is the original Schwartz Database without modification. All classes include a corresponding table without the “-original” suffix; this represents a modified version of the original data incorporating a nomenclatural change in the ID that permits unique identification of each individual and streamlines statistical analysis.

The nomenclatural change in the original ID facilitates identification of each particular animal. For example, consider an animal that started out with ID#1 but lost its original identification tag and was retagged with a new tag number (say, 305). This hypothetical animal appears in the “-original” tables in two rows, as 1 and 305, cross-referenced to make clear that both numbers belong to a single individual. In tables without the “-original” suffix an animal that underwent such tag changes appears in a single row, with its successive ID #s shown as a string. The hypothetical animal would thus appear in these tables with a number S0305_0001. In order to make all entries comparable, animals that only ever had one tag number are similarly changed (i.e. prefix of S [=Sifaka] and right justified number in field of four zeroes).

Descriptions below refer to the tables of the original Schwartz Database.

1. Sifaka2.mbd

A. Table = Master Capture

1. Linked by ID, GP (group), and date
2. Structure
 - a. **ID** = number assigned to animal at capture
 - b. **C & T** = color of collar, shape and color of ID tag
 - c. **SX**= sex, m or f
 - d. **CAPT 1**=date of first capture (date, recorded as mm/dd/yy)
 - e. **GP**=group where animal was resident when first captured
 - f. **WT1**=weight at time of first capture
 - g. **AGE1**=age at first capture, either certain, or estimated or described by tooth wear
 - h. **CAPT2**=date of second capture
 - i. **WT2**=weight at second capture
 - j. **Age2**= age at second capture based on age assigned at first capture
 - k. **CAPT3**=date of third capture
 - l. **AGE3**=age at third capture based on age assigned at first capture
 - m. **WT3**=weight at third capture
 - n. **Notes**=noted are changes in group membership between captures; an animal given a new number if original collar and tag have been lost; the mother, if known, of a newly captured yearling or two year-old.

B. Table = Master Census

1. Linked by ID
2. Structure
 - i. **ID**
 - ii. The annual or biannual censuses denoting group membership for ID animal for the date specified (month/year) as follows, **6/85, 6/86, 6/87, 5/88, 8/89, 8/90, 8/91, 8/92, 8/93, 6/94, 1/95, 8/95, 8/96, 8/97, 1/98, 8/98, 1/99, 7/99, 12/99, 8/00, 11/00, 2/01, 8/01, 1/02, 7/02, 1/03, 8/03, 12/03, 8/04, 4/05, 8/05, 1/06, 8/06, 3/07, 8/07, 1/08, 8/08, 1/09, 7/09, 12/09, 8/10, 1/11, 8/11, 1/12**
3. Notes on data entry: “ddead” = declared dead based on criteria specified in I.2.2.b above, and “dead” = evidence of death such as cadaver or collar and tag have been recovered. There is no record of an animal in the Master Census Table before it was captured, even if it was known to have been in the population. After an animal died or was declared dead, a “-” is placed in that census record. A group is specified for each tagged individual or it is recorded as alone, roaming or visiting. “1ns” indicates an animal was not seen although its specified group was censused. “1gns” means the entire group was not seen. For some of the censuses, two or three months were combined into a single month to make the Master Census less cumbersome and more inclusive.

C. Table = Ages

1. Linked by ID and Date
2. Structure
 - a. **ID**
 - b. **Date**=birth date, either the date the individual was first seen as an infant, or “7/15/xx” for an arbitrary date (see also I.2.1c)
 - c. **Type**=”est” (age estimated by tooth wear) or “cer” for a certain or known birth year or “unk” for unknown.
 - d. Years as follows; **88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12** = the age of each animal in July/August of each year. When an animal dies a “6” is placed in front of the age it would have reached by its next birthday. For example a 623 in the table would mean that that animal died in its 23rd year but before reaching its 23rd birthday. A 600 in the table means an animal of unknown age was declared dead.

D. Table= Females

1. Linked by ID
2. Structure
 - i. **ID**
 - ii. **infx** = did a female have an infant = yes or no from 1984 - 2011. A blank space means the female was not seen. D = female died. J=female is a juvenile, i.e. 1 or 2 years old.
 - iii. **yrxx** =did that infant survive to the following July = yes or no from 1985-2012 or, if that yearling was captured, its ID and sex are recorded. A blank means either the female did not give birth or was not seen
 - iv. **notes** = if maternity of yearling is not certain, it may be noted here.

E. Table= History of named groups

1. Linked by **GP**
2. Structure
 - i. **GP**=standard abbreviation of group name
 - ii. **NAME**=full name of group
 - iii. **AKA**=group also known as
 - iv. **1STSEEN**=(date field) first sighting of the group
 - v. **LASTSEEN**=(date field) last time group was seen
 - vi. **LOC1**=general location of the group, E,SE,NW, C,CN,CS,W, NW,SW, (with C=central)
 - vii. **LOC2**=descriptive location based on color of trail, for example nB1-eBE = north of Blue 1, east of Blue East (see also II.4a)
 - viii. **LAT**=(number field) latitude
 - ix. **LON**=(number field) longitude
 - x. **M1**=ID of first matriarch of group, matriarch being defined as the oldest female in group
 - xi. **M2**=ID of second matriarch of group, who may or may not be closely related to the first matriarch
 - xii. **M3**=ID of third matriarch of group, who may or may not be closely related to other matriarchs
 - xiii. **M4**=ID of fourth matriarch of group, who may or may not be closely related to other matriarchs
 - xiv. **CORE**=yes or no field, yes=for groups spending the majority of their time within the reserve, no=those groups on the periphery of the reserve rarely crossing the fence into the reserve
 - xv. **ANCHOR**=yes or no field, yes= groups of long standing in stable home ranges living within the reserve

F. Table=Life History

1. Linked by **ID**, **GP**, and **Date**

2. Structure

- i. **ID**=individual ID number of animal to which the yes or no fields relate
- ii. **SX**=sex, F or M
- iii. **Date**=(date field) date (mm/dd/yy) when a specific event noted in following yes or no fields occurred
- iv. **GP**=the group where the individual was resident when that event occurred
- v. **AGE**=age of the individual when that event occurred
- vi. **CAPT**=(yes or no field) yes when animal was captured
- vii. **BORN**= (yes or no field) yes when infant was first seen if later captured as a yearling.
- viii. **MOM** = the ID number, if known, of the mother of the infant note in the Field Born (vii)
- ix. **DAD** = the ID number, if known, of the father of the infant noted in the Field Born (vii)
- x. **VISIT** = visited (yes or no field), yes when animal was seen visiting a group (after which date it returns to its resident group)
- xi. **LEFT** = left group (yes or no field), yes when animal left its group and did not return
- xii. **TRANS** = transferred (yes or no field), yes when animal was seen in a new group for several months
- xiii. **RETURN** = returned to group (yes or no field), yes when animal returned to a group after an absence of at least several months
- xiv. **STARTS** = started new group (yes or no field), yes when an animal started a new group
- xv. **GP/DIS** = group disappeared (yes or no field), yes when a group disappeared
- xvi. **IN FIRST SEEN** = (yes or no field), yes when an infant was first seen with a tagged female
- xvii. **IN LAST SEEN** = (yes or no field), yes when an infant was last seen with a tagged female in the first year of life, presumed to have died thereafter
- xviii. **SUR** = (yes or no field) yes if that female's infant survived to the July following its birth
- xix. **BOY** = if a boy, that surviving infant's ID
- xx. **GIRL** = if a girl, that surviving infant's ID
- xxi. **DEAD** = (yes or no field) if animal is known or declared to be dead
- xxii. **LAST SEEN** = (yes or no field) last sighting of an animal subsequently recorded as dead

G. Table = Morphometrics

1. Linked by ID

2. Structure

- i. **SIFAKA ID**=individual ID number of animal using database string number
- ii. **LEGACY ID**=individual ID number of animal given at time of capture
- iii. **CAPTURE**= year that animal was captured
- iv. **MONTH**=month that animal was captured
- v. **NC/RC** = whether the animal is a new capture (NC) or a recapture (RC)
- vi. **GROUP**= the group where the individual was resident when captured
- vii. **SX**=sex, F or M
- viii. **C & T** = color of collar, shape and color of ID tag
- ix. **WT** = weight in kg at time of capture
- x. **1**= Outside hip (gr. Trochanter to gr. Trochanter). Distance between greater trochanters. Animal on stomach, knees together, legs extended. Measurement highly sensitive to position of legs.
- xi. **2**=Bi-acromial width. Distance between the most lateral extensions of the scapulae. Animal on stomach, elbows tucked in to trunk. Measurement highly sensitive to position of arms.
- xii. **3**=Scapula Vertebral border to acromion process.
- xiii. **4**= Dorsal basion to base of tail (1984-1989: called “head to rump length”, measured as occipital protuberance to base of tail). Animal on stomach, nose pointing forward. Head of tape tucked tightly under dorsal basion, tail held up, tape fitted tightly into right-angle thus formed with vertebral column.
- xiv. **5**=Tail length. Head of tape tucked into right-angle as described above, measured to last vertebra in tail.
- xv. **6**= Circumference of chest at the nipple (1984 -1989: measured as maximum chest circumference). Taken just below armpits under moderate tension.
- xvi. **7**= Upper arm. Acromion process to lateral epicondyle of humerus. Tape head on lateral epicondyle of humerus, measured off the acromion.
- xvii. **8**= Circumference of midpoint of upper forelimb. At the midpoint between shoulder and elbow, with moderate tension on the tape measure.
- xviii. **9**= Lower forelimb. Lateral epicondyle to radial styloid. Tape head on lateral epicondyle, measured off radial styloid.
- xix. **10**= Circumference of midpoint of lower forelimb. As in #8.
- xx. **11**= Radial styloid to tip of longest digit. Done holding hand up, with tape head against edge of radial styloid, dorsal surface of hand flattened against the tape.
- xxi. **12**= Radial styloid to crease under longest digit. Same technique as in #11. Crease at base of digit, not the big crease running across the palm.
- xxii. **13**= Palm and longest digit. Tape head where fur ends on wrist, measured off digit.

- xxiii. **14**= Upper hindlimb. Greater trochanter to lateral epicondyle of tibia. Leg loosely bent, tape head on middle of greater trochanter, measured off lateral epicondyle.
- xxiv. **15**= Circumference of midpoint of upper hindlimb. As for other circumferences.
- xxv. **16**= Lower hindlimb. Lateral epicondyle of tibia to lateral malleolus of fibula. Tape head on lateral epicondyle, measured off ankle bone.
- xxvi. **17**= Circumference of midpoint of lower hindlimb. As for other circumferences.
- xxvii. **18**= Calcaneus to tip of longest digit. Done holding foot up, with tape head on the most posterior point on the calcaneus, measured off the digit tip.
- xxviii. **19**= Calcaneus to crease under longest digit. As in #18, with same point about the crease as in #12.
- xxix. **20**= Furthest projection in back of skull to end of snout. Taken using digital calipers.
- xxx. **21**= Maximum cranial width at level of ear. Taken using digital calipers directly in front of the ears.
- xxxi. **22**= Testes width (left (L) and right (R)). Animal on back with legs extended. Each testis measured separately with digital calipers. Width is transverse measurement. Light pressure on calipers. ND=not descended.
- xxxii. **23**= Testes length (L and R). Animal on back with legs extended. Length is measured on the axis of the vertebral column. Light pressure on calipers. ND=not descended.
- xxxiii. **24**= Big toe. Done holding foot up, with tape head on tip of toe, measured to crease at base of toe.
- xxxiv. **NOTES** = noted are measurer's identity when known, whether the animal was struggling at the time of measurement, and pertinent information regarding the animal's condition and ID at time of capture.

4. GROUP LOCATION¹

The following information is included for all locations recorded from 1985-2005:

- A. Structure
 - a. ID (only entered some of the time)
 - b. GROUP
 - c. LAT
 - d. LONG
 - e. SOURCE of data
 - i. AR (Alison Richard)
 - ii. DB (Diane Brockman)
 - iii. KK (Kashka Kubzdela)
 - iv. TEAM (Monitoring Team)

¹ To be incorporated into the Database in 2015

5. CONTRIBUTORS TO THE DATABASE, AND CENSUS RECORDS USED AS SOURCES

The following individuals have contributed information recorded in the Database since AR initiated the research program in 1984:

Pothin Rakotomanga, Behaligno, Enafa, Elahavelo, Efitiria, Edouard Ramahatratra, Rigobert Emady, Edidy Ellis, Lala Ellis, Helian Ratsirarson, Elysé Rajaonarivalona, Sylvia Ravelonjatovo, Jeannicq Randrianarisoa, Ny Andry, Jacky Youssouf, Miandrisoa Razafindrabe, Joelisoa Ratsirarson, Jeannin Ranaivonasy, Kashka Kubzdela, Diane Brockman, Richard Lawler, Roshna Wunderrlich, Patricia Whitten, Merrill Baker, Sheila O'Connor, Mark Pigeon, Robert Dewar, Marion Schwartz, Laurie Godfrey, Andry Andrianandrasana, Ny Yamashita

Sources used in census records:

Note Books	AR	1985-2011
Capture Sheets	Team	1985-2011
Note Book	KK	7/93-6/94
Note Books	DB, PW and students	2003 & 2005
Note Books	Monitoring team	1995-2007
Monthly compiled censuses (electronic)	JR	12/01-2/12

Census data drawn upon for Database

Date	Source*	Timespan of data collection
1984-1985	AR	1 year
1986-2011	AR	1 month (July or August) yearly, except '94,'97,'03; 1 month (Jan) in '95,'98,'99,'01,'03
8/96-7/97	JR	Quarterly reports
8/97-4/98	JR	Bi-monthly reports
8/98, 9/98	JR	1 month
1/99-8/05** 1/06-11/06 1/07-3/07 12/07-9/08 12/08-10/10 1/11-3/11 7/11-2/12	JR	Monthly reports
7/93-6/94	KK	Weekly
6/98, 7/03, 7/05	DB	1 month
7/00, 8/00	DB	2 months

* From 1993, data collection by field researchers was greatly assisted by monitoring team members, and from 1999 the monitoring team collected monthly census data under the leadership of the ESSA field coordinator.

**No reports are available for the following months (month/year): 2/99, 3/99, 8/99, 4/00, 5/00, 6/00, 2/01, 5/02, 6/02, 12/02, 10/03, 11/03, 1/04, 3/04, 4/04, 5/04, 9/05, 10/05, 11/05, 12/05.

PART II: COLLECTION OF FIELD DATA

1. CENSUSING

All trails were walked during a census, and the presence of animals was detected by sight, sound or, occasionally, scent. The objective of the census was to record the location and group affiliation (if any) of all tagged individuals, the presence of dependent infants, and the total composition of groups, including unmarked individuals. Changes in the frequency of censuses are described in Part I, 2.2.d (and see Part I, 5). Two to three days were usually sufficient to census all groups living wholly or largely in Parcel 1 of the Reserve (see Appendix 2) and to record the presence/absence of tagged individuals in groups adjacent to the Reserve.

2. CAPTURE, MARKING, AND RELEASE

a. Capture and release methods

Three classes of animals were excluded from the capture program: individuals <12 months old, as estimated by size or direct knowledge of birth date; pregnant females (ascertained visually); and females with offspring <12 months old.

Animals were captured using a Telinect blowgun and darts loaded with a sedative. Animals were rarely darted at a distance of greater than ~10m. From 1984-1992, Ketamine in combination with Rompun was used for sedation.

From 1992, Telazol was used instead of Ketamine/Rompun, because it is more soluble and does not cause an excitatory phase. Telazol is a cocktail of tiletamine hydrochloride and benzodiazepines (minor tranquilizers of the valium class).

One vial contained 500mg of Telazol in powdered form, to which 2.5ml sterile water was added on the day of use. Each dart delivered 0.4-0.5ml of the drug in solution, at a dosage of 40-50mg/kg. These levels substantially exceeded the recommended concentration and dosage. Even so, the elapsed time to full sedation varied from a few minutes to 15 minutes, and some animals were sedated only after the addition of 0.2ml and, occasionally, a further 0.1ml. The reasons for this variation likely include the volume of drug actually delivered, the drug's temperature at the time of injection, the animal's activity prior to darting, and variations in individual resistance to the drug. On hot days, bottles containing the drug in solution were wrapped in a wet sponge to keep them cool in the forest.

Typically, the darted individual fell out of the tree once sedated, and was caught in a sheet held out above the ground. Occasionally, a darted individual remained lodged in the tree, and was retrieved by a member of the field team. If that was not possible, an observer remained until the animal was fully alert again.

Sedated animals were carried back to camp in baskets and released early in the day after their capture, at the capture site, to which they were carried in holding cages covered with a sheet. From 2003, capturing was limited to the morning or early afternoon. This allowed partial recovery from sedation before the

nighttime drop in ambient temperature. It also minimized the risk that an animal would not have recovered full motor coordination when released. Recovery time varied widely, and animals that appeared fully alert could still show poor coordination if returned to the forest prematurely. After processing, each animal was returned to a holding cage and monitored closely. Animals from the same group were housed together. The holding area was shaded at all times of day.

b. General care of sedated individuals

To ensure correct identification, a collar and tag were loosely attached around the animal's neck immediately on arrival in camp, and its tag number, group, and location of capture recorded on the Capture Data Sheet.

Next, the animal's temperature was recorded, using a rectal thermometer and disposable cover. Sedatives destabilized thermoregulation in some individuals, resulting in a drop in body temperature on cool days and an increase on hot ones.

If body temperature fell below ~97°F, a member of the field team sat in the sun with the affected individual, its stomach exposed and eyes shielded. When its temperature rose above 97°F, the animal was returned to the processing table and kept in a curled up position on its side to minimize heat loss. Body temperature was monitored every 15 minutes, and the warming procedure repeated as necessary.

If body temperature rose above ~100.5°F, the animal was sprinkled with cold water with its stomach exposed. Its temperature was monitored every 15 minutes, and the cooling procedure repeated as necessary.

The body temperature of individuals captured in the afternoon was closely monitored through the evening as ambient temperatures fell. Animals still partially or completely sedated and whose body temperature fell below ~97°F were given hot water bottles in their holding cages, wrapped in space blankets, or held by one of the field team until their temperature rose to within the normal range.

c. Marking for individual identification

i) Tags and collars

Each individual was assigned a unique numbered, plastic tag. At first, tags had their numbers engraved on only one side, but numbers were subsequently engraved on both sides in order to facilitate censusing. Tag shapes and colors were coded as follows:

Square: C, or CA (=carré)

Round: Z (through 1989), then RO

Losange or Diamond: L (through 1989), then D, or DI

Rectangle: R, or RE

Triangle: T, or TR

Hexagonal: HX

*Shield: S, O-C (=ovale-carré)

*Heart: H

*Flower: F

*Bell: B

*These were metal tags, only used in the 1989 capture season.

The tag was attached to a metal ring sewn by the manufacturer into a ½” nylon collar. From 1984 to 1997, two attachment mechanisms were used: S-hooks and key rings. Some tags were lost as S-hooks straightened out, others as key rings gradually rusted and broke. From 1998, tags were attached with a 2” length of multi-strand, stainless steel sailboat rigging wire. The ends of the wire were crimped together in a small lead sleeve using a swage. This attachment system is referred to as “Ned” or “Rich” on the Capture Sheet.

The nylon collar was cut to the appropriate length with a razor blade, and the cut end melted and sealed with a flame. The collar was buckled tightly enough around the animal’s neck to ensure that it could slip over the head and loosely enough to allow room for growth in young animals, and also space for grooming under the collar. In Jan 1999, two animals (born ’95 and ’96) were recaptured and their collars loosened, because they had a build-up of parasites underneath. The loose end of the collar was bound to the collar body with nylon filament.

After adoption of the “Rich” system, the weakest link in the marking procedure became the collar itself. Animals lost collars occasionally, either because they came undone or because they were attached too loosely.

Collar colors were named and coded as follows:

Vert = green, VE

Vert-claire = light green, VC

Jaune = yellow, JA

Rouge = red, RO

Beige = beige, BE

Brun = brown, BR

Bleu = blue, BU

Bleu-Claire = light blue, BC

Rose = pink, PI

Noir = black, NO

Orange – OR

Violet -- VI

ii) Ear-notches. Each animal’s ears were notched, using a binary system corresponding to the animal’s tag number. Each ear had three notch positions – top, middle, and bottom – with values of 1, 2, 4 (animal’s right ear), and 8, 16, and 32 (left ear), yielding a total of 63 unique combinations (Appendix 3). The sequence was re-started with the individual tagged #64, and again with the individual tagged #127, and so on. Although all tagged animals had individually identifying tags, they had the same ear-notch configuration if they occupied the same position in the ear-notch sequence of 1-63. Some animals also had natural notches as a result of fighting. An effort was made to match the animal’s ID number to a notch pattern that incorporated natural notches. It sometimes became difficult or impossible to “read” notches if a notched ear was subsequently torn in a fight. The notcher used in creating the Database is no longer manufactured, but closely resembles #50 N Punch, #N12 Triangle Notch with a 1/8th wide slot, made today by MC Mieth Manufacturing.

iii) Tattoos. Initially, each animal's inner thigh was shaved and tattooed with its ID number. With black ink on black skin, the tattoos were impossible to read in the forest, and difficult to read even when animals were recaptured and sedated. The procedure was abandoned in 1987.

3. INFORMATION COLLECTED

a. Capture Sheet

A Capture Sheet, or Demographic Data sheet, was used to record all data collected on a captured individual. It was modified over the years (Appendix 4), the most significant change being the addition of more morphometric data in 1992.

Five types of information were recorded on the Capture Sheet (CS):

- 1) capture and capture context: date and time of capture, capture location, dosage, rectal temperature at time of arrival in camp (and thereafter, as appropriate). Date of capture is mostly recorded as dd/mm/yy, sometimes as 4 Jan 1993 (for example), and occasionally as mm/dd/yy, depending on who was recording data at the time. In cases where the date on the CS is ambiguous (e.g. 6/8/03 could be June 8 or 6 Aug), refer to the date in the Master Capture Table, which is always given as mm/dd/yy and is unambiguously correct.
- 2) individual identification: sex and age class, identification number, collar color, tag shape and color, and tag attachment type, ear notch combination
- 3) weight, physical description, and morphometrics
- 4) samples taken
- 5) identity of researcher taking measurements, to allow for the correction of systematic inter-individual biases

Items (3) and (4) are discussed in the next two sections.

b. Weight, physical description, and morphometrics

Weight was recorded in kg, to two decimal points, using a spring balance in early years, and a digital scale more recently.

For the **physical description**, any distinctive features were noted first. Otherwise, a descriptive "scoring system" was developed and used with increasing consistency as follows:

i) General condition. Scored as "Good" or particular feature(s) noted (e.g. loss of fur, blindness, scar tissue, fresh wound, emaciated appearance).

ii) Throat gland.

- a) not visible
- b) barely visible/light brown
- c) dark brown
- d) dark brown, sticky
- e) dark brown, sticky secretions extending to chest

iii) Nipples.

- a) barely visible

b) present, not elongate

c) elongate

iv) Vulva.

a) small, pale pink

b) large, swollen, bright or dirty pink

c) moderate sized

v) Testes.

a) not descended

b) tiny, furry

c) small, furry

d) medium-sized, some fur

e) big, black testes

vi) Teeth. Broken or chipped teeth were noted, and qualitative assessment was made of size of incisors and canines in juveniles; for (upper and lower) incisors, canines and molars, wear was noted for each tooth type as “none”, “light”, “moderate”, “heavy” or “very heavy”.

Morphometric data were collected and recorded from 1984-2011. Different terms were used to describe some measurements in the early years, even though using the same landmarks as in later years. Table G consolidates measurements using the same landmarks, regardless of original descriptor term. The number of measurements taken increased over time, so that data for certain measurements are not available for all years. No data were collected in 1988, 1990, and 1997.

Different researchers took measurements over the years, and the measurer’s identity is recorded in the Notes field of Table G when known. Systematic differences between measurers have not been explored. Certain measurements were difficult to take consistently, and this may be a source of random variation in measurements. This is particularly the case for testes width and length. For measurements taken annually from 1992-2001, a strong correlation between testes width and length was found except in 1992 (Brockman and Godrey, pers.com.) and 1992 testes measurements are not included in Table G. It is likely that the subject’s muscle tension affected some measurements, and notes recorded on the capture sheet about this are included in the Table G Notes field.

Skinfold thickness was measured with calipers on the biceps, abdomen and nape of some individuals from 1984 – 1995. This measurement was abandoned when the consistency of repeated measurements on individual animals was found to be low. These data are not included in Table G.

Measurements were taken using a plasticized cloth tape measure, unless otherwise indicated. Other than transverse measurements, measurements were taken on the animal’s left side.

c. Samples taken

i) Ear-notch tissue. Notched tissue is transferred with tweezers to a marked vial containing EDTA. The vial was sealed and kept at ambient temperature in the field, and stored in a refrigerator after the capture season.

ii) Dental impression. The upper dentition was cleaned with a toothbrush and dried with pressurized air before an impression was taken using Xantoprin (@ 1 tube=5 animals). The amount of hardener needed

varied with ambient temperature (16-19 drops). From 1984 - 1999, impressions were taken of all individuals, and since then only of animals 2 years old or older.

iii) Hair. A tuft of 20-50 hairs was pulled from the top of each individual's head using pliers. Samples were initially stored in small paper envelopes and subsequently in plastic bags, which improved their preservation.

4. RECORDING THE LOCATION OF INDIVIDUALS AND GROUPS

The population from which the Schwartz Database was drawn included all animals living in Parcel 1 (Appendix 2) of the Bezà Mahafaly Special Reserve. Eighty hectares in size, Parcel I is part of a larger contiguous forest. The Parcel is bounded by the Sakamena River in the East, an unpaved road to Mahazoarivo in the West, an oxen cart trail in the South and a forest path in the North. Since 1979, Parcel I has been enclosed by a 3-stranded barbed wire fence, about 1m high, to exclude cattle and goats.

a. The trail system

Coordinates taken from a grid of trails were used to record the location of individuals and groups in Parcel I. The grid was started in 1981, and completed in 1984-85. Compass directions were used to cut narrow (<1m), parallel trails at 100m intervals north-south, and east-west. In 1986, one further trail (Pink IV) was added. The trails do not all run perfectly parallel, and the actual grid was mapped, first by compass, and then by GPS coordinates (Appendix 2).

Trails are marked with rings painted around tree trunks at intervals along the trails. Trails are identified by color, and by number of rings. Data collectors have used French, Malagasy and English words for colors and compass directions interchangeably, and in varying combinations. For example, the same location might be recorded as OB (Ouest de Bleu) or WB (West of Blue).

For the east-west trails, names and shorthand codes used by collectors of field data include the following (from South to North):

Blue I (one blue ring): coded BI

Blue II (two blue rings): coded BII

Blue III (three blue rings): coded BIII

Pink I (one pink ring): coded RI [Rose], or PI

Pink II (two pink rings): coded RII, or PII

Pink III (three pink rings): coded RIII, or PIII

Pink IV (four pink rings): coded RIV, or PIV

Colors of the north-south trails approximate the order of colors in the rainbow. The color sequence is repeated once to complete the grid. The following names and shorthand codes have been most commonly used to record data (from East to West):

Red East (one red ring): coded R, or RE

Orange East (one orange ring): coded O, or OE

Yellow East (one yellow ring): coded J [Jaune], JE, or YE

Green East (one green ring): coded, V [Vert], VE, or GE

Blue East (one blue ring): coded B, or BE

Pink East (one pink ring): coded M [Mauve] R [Rose], or PE
 White East (one white ring): coded F [Fotsy], BI [Blanc], BIE, or WE
 Black, or Black East (one black ring): coded N [Noir] or Center
 Red West (one red ring): coded R2 or RW
 Orange West (one orange ring): coded O2 or OW
 Yellow West (one yellow circle, J2 through 1991, then JW)
 Green West (one green circle, V2 through 1991, then VW)
 Blue West (one blue circle, B2 through 1991, then BW)

NB. From Nov. 1984- Feb. 1985, the north-south trail codes were prefixed with “N”. The “N” was dropped in March 1985.

The barbed-wire fence along the western boundary of the Reserve is called Vala-W, along the northern boundary Vala-N, and along the southern boundary Vala-S.

b. Recording individual and group locations

From 1984-2005, the two trails (N/S and E/W) closest to an observed individual were used as coordinates to record its location. Four combinations of coordinates are possible within a given quadrat. For example, if an individual was observed between BI and BII, and between N and RW, depending on its proximity to those trails its location was recorded as: NBI, WN; **or** SBII, WN; **or** NBI, ERW; **or** SBII, ERW. From 2005, GPS coordinates were used to record individual (and group) locations.

An individual was recorded as with a named group, when other members of that group were identified close by. If the group was one with which the individual had not previously been seen, the individual was recorded as “Visiting”, and its location was used as a record of the location of the group being visited. When no other animals were detected in the vicinity of the individual being censused, it was recorded as “Alone”, or “Wandering”.

5. INDIVIDUAL AND GROUP NAMES

From 1984-1992, every individual captured was given a name on its Capture Sheet. Some were subjects of focal studies. The practice of naming individuals was abandoned as the number of marked animals and size of the study population increased.

A group was given a name if it contained at least one male and one female in a stable association (i.e., if they were together on repeated sightings), and if at least one individual was clearly recognizable (or tagged). In practice, this meant that most groups were partially or completely habituated by the time they were named.

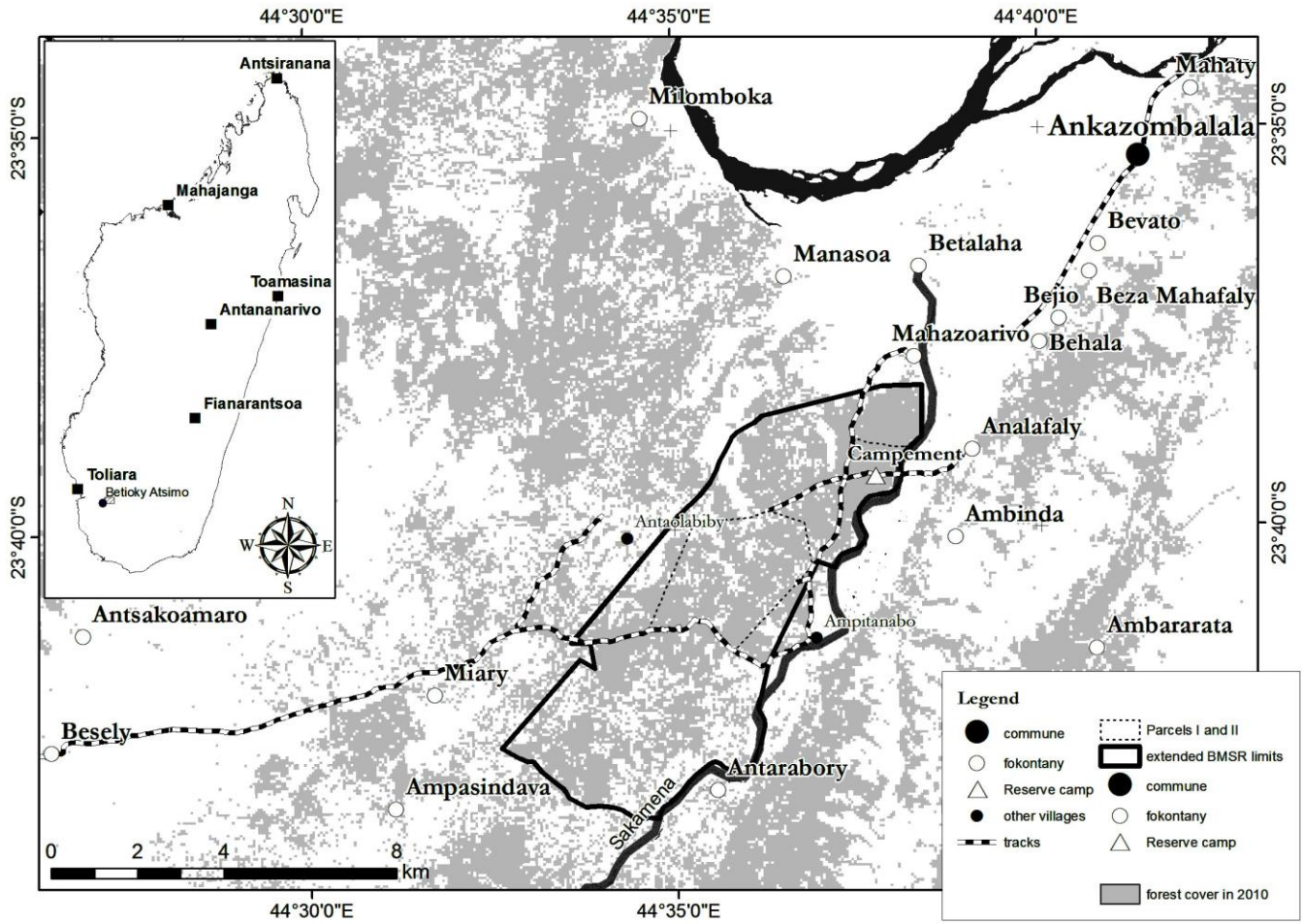
The identification of newly encountered associations of animals evolved over time. A group was given the name “Mpivady” in 1984. After it disappeared in 1989, that name (or Mpivady-Vao) was applied to any newly encountered pair, as in Mpivady II, III, IV etc. Groups with >2 adults were given names. Many associations turned out to be ephemeral, however, and it was hard to keep track of the Mpivady numbering system and proliferation of names. From 1995, regardless of size a new group was identified as NWGP 1,2,3.... until observers were confident of its stability, and at that point it was named. This too became

problematic as NWGPs were added to the list and it became hard to keep track of the numbering system. From 2007-08, a NWGP was identified by the month and year it was first seen, e.g. NWGPAug07. In practice, that proved hard to keep straight too.

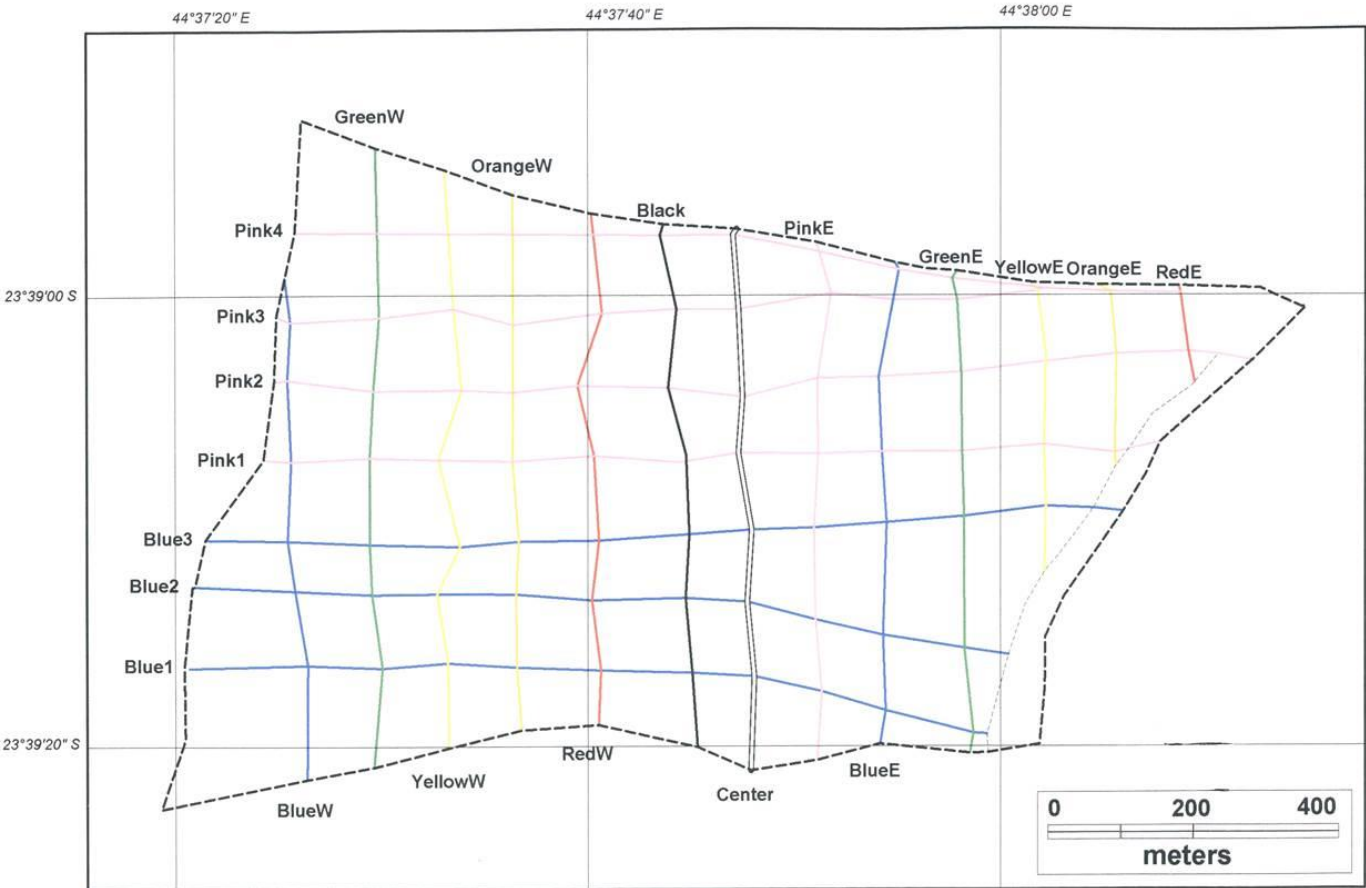
Groups were sometimes given an existing name with the suffix “2”. This happened when the group (1) contained a collared female from the parent/already-named group, (2) contained an individual with a similar distinctive feature (e.g. blindness) or (3) was first identified within the home range of the already-named group, or in the interstices between that group and another group.

Most group names are in the Malagasy language, and associated with particular people, places, or events. Names were shortened into Code IDs for the Database, and these came to be used in the field too (see Appendix 5 for a history of group names).

Appendix 1: Location of Bezà Mahafaly Special Reserve

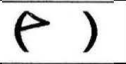
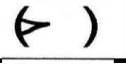
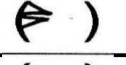



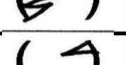



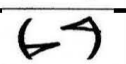
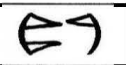
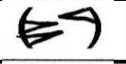







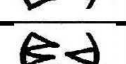




Appendix 2: Map of the grid system of Parcel I in Bezà Mahafaly Special Reserve























Appendix 3: Ear-notch system of captured individuals

Ear Notching Patterns for *Propithecus*

	1	64	127	190	253	316	379	442	505	568	631	694	757	820
	2	65	128	191	254	317	380	443	506	569	632	695	758	821
	3	66	129	192	255	318	381	444	507	570	633	696	759	822
	4	67	130	193	256	319	382	445	508	571	634	697	760	823
	5	68	131	194	257	320	383	446	509	572	635	698	761	824
	6	69	132	195	258	321	384	447	510	573	636	699	762	825
	7	70	133	196	259	322	385	448	511	574	637	700	763	826
	8	71	134	197	260	323	386	449	512	575	638	701	764	827
	9	72	135	198	261	324	387	450	513	576	639	702	765	828
	10	73	136	199	262	325	388	451	514	577	640	703	766	829
	11	74	137	200	263	326	389	452	515	578	641	704	767	830
	12	75	138	201	264	327	390	453	516	579	642	705	768	831
	13	76	139	202	265	328	391	454	517	580	643	706	769	832
	14	77	140	203	266	329	392	455	518	581	644	707	770	833
	15	78	141	204	267	330	393	456	519	582	645	708	771	834
	16	79	142	205	268	331	394	457	520	583	646	709	772	835
	17	80	143	206	269	332	395	458	521	584	647	710	773	836
	18	81	144	207	270	333	396	459	522	585	648	711	774	837
	19	82	145	208	271	334	397	460	523	586	649	712	775	838
	20	83	146	209	272	335	398	461	524	587	650	713	776	839
	21	84	147	210	273	336	399	462	525	588	651	714	777	840
	22	85	148	211	274	337	400	463	526	589	652	715	778	841
	23	86	149	212	275	338	401	464	527	590	653	716	779	842

Ear Notching Patterns for *Propithecus*

	24	87	150	213	276	339	402	465	528	591	654	717	780	843
	25	88	151	214	277	340	403	466	529	592	655	718	781	844
	26	89	152	215	278	341	404	467	530	593	656	719	782	845
	27	90	153	216	279	342	405	468	531	594	657	720	783	846
	28	91	154	217	280	343	406	469	532	595	658	721	784	847
	29	92	155	218	281	344	407	470	533	596	659	722	785	848
	30	93	156	219	282	345	408	471	534	597	660	723	786	849
	31	94	157	220	283	346	409	472	535	598	661	724	787	850
	32	95	158	221	284	347	410	473	536	599	662	725	788	851
	33	96	159	222	285	348	411	474	537	600	663	726	789	852
	34	97	160	223	286	349	412	475	538	601	664	727	790	853
	35	98	161	224	287	350	413	476	539	602	665	728	791	854
	36	99	162	225	288	351	414	477	540	603	666	729	792	855
	37	100	163	226	289	352	415	478	541	604	667	730	793	856
	38	101	164	227	290	353	416	479	542	605	668	731	794	857
	39	102	165	228	291	354	417	480	543	606	669	732	795	858
	40	103	166	229	292	355	418	481	544	607	670	733	796	859
	41	104	167	230	293	356	419	482	545	608	671	734	797	860
	42	105	168	231	294	357	420	483	546	609	672	735	798	861
	43	106	169	232	295	358	421	484	547	610	673	736	799	862

Appendix 4: Capture sheets used since outset of research program

Example 1: 1985 – only 3 morphometrics measurements recorded

10

No morphometrics 10

"Fangaraka John"

DEMOGRAPHIC DATA SHEET

I.D. #: 10 Date of capture: 6 Feb. 85 Social group: Vaovao
 Tattoo #: 10 Age class: A ♂ Weight: 3.05 kg.
 Collar and tag: Blen / noir carbe

Hair sample: ✓ Dental cast: ✓

Measurements

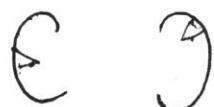
Head-rump length: 38
 Tail length: 47
 Chest circumference: 43.5

Skinfold thickness

Biceps: 2, 2, 2
 Abdomen: 3, 2, 2
 Nape: 3, 3, 3

Notes on teeth: RI broken off at base
 Moderate wear on M's.
 V. long C's - "mature" adult.

General physical condition: Good. Dark throat. Tick on upper eyelid of both eyes

Ears:  Intact.

Other identifying marks: None. Large testicles.

Veteln • Dose ^{fell with to knock} 2cc. + 1cc. _{↓ out further}
 • Onset ~ 2 min.
 • Duration

Capture time • 1630h.
 Release 1830h.
 Location • E Rose
 NBI.

Example 2: 1992 - with morphometrics on page 2

205

205

DEMOGRAPHIC DATA SHEET

Name: ELONGANA

Date: 25th July '92 Weight: 1.950 kg

Social Group: Emelia

Collar and Tag: red collar Notes on Teeth: intact, no wear
red rectangle tag

Hair Sample: ✓

Dental Cast: ✓

Skinfold thickness:

Age Class: Young ♂ - small testicles

Biceps:

Abdomen:

General Physical Condition: Good

Nape:

Temperature: 95.0

Identifying Marks:

No sign of th. gland activity



Natural Notches



Given Notches

Ketamine: Dose: 0.5 ml @ 75 mg.
Telazol Onset: Went down fine
Duration:

Capture Time: 10 30 h.
Capture Location: WJ2 BI
Release Time:

Processed by: Munson

205
189
16

- 206 206
- 1.) scapula (vertebral border to acromion process) 5.9 cm
 - 2.) bi-acromial width 9.9 cm
 - 3.) upper arm (acromion pro. to lat. epicondyle of humerus) 9.9 cm
 - 4.) circumference of midpoint of upper forelimb 7.4 cm
 - 5.) lower forelimb (lat. epicondyle to radial styloid) 9.3 cm
 - 6.) circumference of midpoint of lower forelimb 6.9 cm
 - 7.) radial styloid to tip of longest digit 9.5 cm
 - 8.) radial styloid to crease under longest digit 5.4 cm
 - 9.) palm and longest digit 8.6 cm
 - 10.) upper hindlimb (gr. trochanter to lat. epicondyle of tibia) 15.1 cm
 - 11.) circumference of midpoint of upper hindlimb 13.0 cm
 - 12.) lower hindlimb (lat. epicondyle of tibia to lat. malleolus of fibula) 14.1 cm
 - 13.) circumference of midpoint of lower hindlimb 7.7 cm
 - 14.) calcaneus to crease under longest digit 8.4 cm
 - 15.) circumference of chest at the nipple 29.9 cm
 - 16.) dorsal basion to base of tail 32.7 cm
 - 19.) tail length 49.6 cm
 - 20.) outside hip (greater trochanter to gr. trochanter) 6.7 cm
 - 22.) testes width 1.0 cm
 - 23.) testes breadth 0.53 cm
 - 24.) furthest projection in back of skull to end of snout 7.92 cm
 - 25.) maximum cranial width at level of the ear 5.73 cm

Example 3: 1995 – with morphometrics

DEMOGRAPHIC DATA SHEET

1/95

293

Social Group: GOBERA

Date: 8 Jan '98

Sex/Age Class/Name: A 5⁰

Capture Time: 10:35

Location: PINK IV, W. Fence W.

Collar and Tag: BEIGE & BLUE

Dose: 0.5ml.

Processed by: AFR, RL et al.

Ned's system

(Rectangle)
triangleTemperature: > 105, cooled him with
some downHair Sample:

Weight: 3.1

Dental Cast:

Tissue Vial:

Identifying marks and general physical condition:

A. Ears:  
Natural GivenB. Teeth: intact, big C's, not much wear
Moderate →

C. Genitalia: Big, furry.

D. Throat gland/nipples: light brown, not sticky

E. Parasites: None evident

F. Eyes: fine

G. Other (nose blaze, etc.): Fine-looking male

1. Outside hip (greater trochanter to gr. Trochanter) 11.1
2. Bi-acromial width 9.6
3. Scapula (vertebral border to acromion process) 3.6
4. Dorsal basion to base of tail 32.3
5. Tail length 43.0
6. Circumference of chest at the nipple 25.9
7. Upper arm (acromion proc. to lat. Epicondyle of humerus) 8.4
8. Circumference of midpoint of upper forelimb 10.3
9. Lower forelimb (lat. epicondyle to radial styloid) 9.2
10. Circumference of midpoint of lower forelimb 7.8
11. Radial styloid to tip of longest digit 9.1
12. Radial styloid to crease under longest digit 4.8
13. Palm and longest digit 8.8
14. Upper hindlimb (gr. trochanter to lat. epi. of tibia) 14.8
15. Circumference of midpoint of upper hindlimb 16.2
16. Lower hindlimb (lat. epi. tibia to lat. malleolus of tibia) 14.7
17. Circumference of midpoint of lower hindlimb 9.1
18. Calcaneous to tip of longest digit 11.6
19. Calcaneous to crease under longest digit 7.9
20. Furthest projection in back of skull to end of snout 8.8
21. Maximum cranial width at level of the ear 5.4
22. Testes width R = 1.5 L = 1.4
23. Testes length R = 1.8 L = 1.8

Example 4: 2006 --present: addition of big toe to morphometric measurements

DEMOGRAPHIC DATA SHEET

720

Social group: VAVMAS

Date: 9 Aug. '11

Sex/Age class/Name:

Capture time: 10:55

A ♀

Location: N. Bl III, Yellow E.

Collar and Tag:

Dose: 0.4 ml

BU, RO, RO

Who attached the collar?

Processed by: Rich

RUSHNA

Temperature: 95.9°F
94.3°F
94.6°F

Hair sample: Yes No

Tissue vial: Yes No

Weight: 2.60

Dental cast: Yes No

Identifying marks and general physical condition:

NOTHING
NATURAL
ON (2)

A. Ears



B. Teeth: LIGHT TO MODERATE WEAR, BLUNTED LAININES

C. Genitalia: PINK VULVA

D. Throat gland/nipples: ELEVATED NIPPLES

E. Parasites: 15-20 IN FRONT/ARMPIT

F. Eyes: CLEAR, FINE

G. Others (nose blaze, etc.):

DIRTY ~~TAIL~~
TAIL, EVIDENCE OF DIARRHEA

1. Outside hip (greater trochanter to greater trochanter) 10.9
2. Bi-acromial width 5.7
3. Scapula (vertebral border to acromion process) 4.0
4. Dorsal basion to base of tail 35.2
5. Tail length 52.1
6. Circumference of chest at nipple 24.9
7. Upper arm (acromion process to lateral epicondyle of humerus) 9.6
8. Circumference of midpoint of upper forelimb 8.6
9. Lower forelimb (lateral epicondyle to radial styloid) 10.4
10. Circumference of midpoint of lower forelimb 7.5
11. Radial styloid to tip of longest digit 10.3
12. Radial styloid to crease under longest digit 5.5
13. Palm and longest digit 9.5
14. Upper hindlimb (greater trochanter to lateral epicondyle of tibia) 18.1
15. Circumference of midpoint of upper hindlimb 13.6
16. Lower hindlimb (lateral epicondyle of tibia to lateral malleolus of fibula) 15.1
17. Circumference of midpoint of lower hindlimb 7.4
18. Calcaneous to tip of longest digit 12.9
19. Calcaneous to crease under longest digit 8.9
20. Furthest projection in back of skull to end of snout 85.6
21. Maximum cranial width at level of ear 57.1
22. Testes width R: _____ L: _____
23. Testes length R: _____ L: _____
24. Big toe length (base of foot pad to tip) 11.2 8.4

Appendix 5: History of Group Names

The rationale for the naming of groups in the Database is given below, by year of naming:

1984-85:

Andafy (=overseas): a group with a range largely outside the Reserve

Diso (=mistake): a lot of confusion about this group's location and composition; in Database from 1993 as *TsyEmelia*

Domoina (=dove): dove cooing nearby when first individual in group was darted

Emelia: named for Emelia Oleson, visiting from New York

Fanondro Very (=missing finger): one of animals had a missing digit

Felix: named for Felix Rakotondraparany, tenrec specialist at Parc de Tsimbazaza at that time, who came to Bezà with Martin Nicoll to inventory small mammals

Fety (=festival): animals darted and group named on a day marked as Fety in the calendar

Fotaka(=mud): range included one of the mud holes on the road along the southern perimeter of Parcel I

Lahy Goa (=blind male): contained a male blind in one eye. Also briefly referred to as "Very" (=lost) and "Lahy Goa Diso".

Lalao's group: not known

Lavaka(=cave, hole): one of animals had a hole in his ear. Briefly called "Dytra" in 1991. (Renamed *Papozyin* 1991)

Leslie: named for Leslie Blay, wife of the head of UNDP (Paul Blay), who visited and helped capture

Lolo (=ghost): there was initial confusion about whether this group actually existed – perhaps they were ghosts?

Nenibe (=old lady): markedly old female in the group

SakamenaSud: group's range was on bank of Sakamena River in SE corner of Parcel I

Tafara's group: named for Tafaramanana, one of the original staff

Trano (=house): group's range was on the edge of camp

Vaovao (=new): last of four groups identified and habituated for focal studies in '84-85

Vavy Goa (=blind female): contained a female blind in one eye

Vavy Goa2; another group with a female blind in one eye

VavyMasiaka (=fierce females): very aggressive females repeatedly chased us

Vavy Masiaka2: (= *VavyMasiaka du fil*); another aggressive group, located near barbed wire ("fil") in NW

ZavamaniryMadamo (=vegetation lady): named for Sheila O'Connor, who came to Bezà to teach plant ecology in the field school

1986:

Andrefana (=west): group's range was in the NW of Parcel I. In Database from 1995 as *Kashka*

Sary (=picture, photo): someone had a camera when members of this group were darted

1987:

Andrefana2 (=west); group's range was in the west

1988:

None named

1989:

Disoraty (= a bad mistake). A group identified after confusion and mistakes as to its identity
Enafa: named for Enafa; initially called *Andrefatimo*(=southwest), for range in SW corner of Parcel I
Masiaka Be (=very fierce). Another very aggressive group
Nify (=teeth): named for Marion Schwartz, “the tooth lady”

1990:

Nia-Nia: named for the sickle billed Vanga calling nearby at the time. Steve Zack was at Bezà that season,. (Also called *Neanea*).
Tsy Goa, also referred to as *Lahy Goa-Vao* (=not blind, and new blind male): Named after confusion as to whether there was a blind animal in the group/whether this group was actually Lahy Goa. It turned out there was indeed a blind male in Tsy Goa, but it was a different group from Lahy Goa.
Vahiny(=visitor): named for the group’s home range, which extended considerably north of Parcel I’s boundary as well as inside.

1991:

Papozzy: named for a female in Sary who established her own group (= *Lavaka*, 1985; also referred to as *Pap-D*, and *Papcel*)

1992:

Celeste: named for Celeste Peterson, a US school student helping with childcare
Chocolat: named for an individual with a particularly dark and extensive head-cap
Emelia2: a new group established in proximity to *Emelia*
Lolo 2: founded by a marked female who left *Lolo* (*TRUE?*)
Mangakely(=little blue): named for the short wheel-base, right-hand drive Toyota used by the project from 1984-1996

1993:

Avaratra (=north): group ranged in NW corner of Parcel I
Boribory (=round): I do not know the reason
Didy: named for Edidy Ellis, a member of the monitoring team at the time; briefly referred to as *Raikipitia*, for reasons unknown
Maka: named for one of the original staff at Bezà, Maka Cyrille
Pothin: named for Pothin Rakotomanga; in Database as *Rivotse* from 1995
Saba: not known. ?
TsyEmelia (=not Emelia): another group named after being mistakenly identified as Emelia (= *Diso*),
Vasa Diso (=perhaps a mistake): a name given to a group about whose identity there was confusion
Vamba: named for the local word meaning when a male is seen with a different female

1994:

Esambeto: named for a village leader working closely with the Reserve manager
Gobera: named for Jean Emady Rigobert, a founding member of the monitoring team.
PapCel: named when Papozzy and Celeste coalesced for a period. (See also *Papozzy*, 1991)

1995:

Honoré: named for the driver Honoré working for Bezà at that time

Kashka: named for Kashka Kubzdela, doing her PhD research at Bezà at that time. (= *Andrefana*, 1986)

Rivotse (=wind): named on a windy day (= *Pothin*, 1993)

Tatiana: named for a visiting researcher

1996:

Elysé: named for Elysé Razanajaonarivalona, who was working at Bezà at the time

Lanto: named for Lanto X, who was working at Bezà at the time. Group later called *Rabingy* (1998) for Helian Ratsirarson, who was working at Bezà at the time

Sarivady (=female from Sary): named for the group's founding female, who came from *Sary*

1997:

Diane: named for Diane Brockman

Rengoroka: named for Ralaivao (his nickname), a MNP staff member at that time

1998:

Koto: named for Koto Bernard the head of the Zombitse National Park, who was visiting Bezà

Pap-D: see *Papozy*, 1991

Perline: named for the cook at camp at the time

Rabingy: named for Helian Ratsirarson, who was working at Bezà at the time (and see *Lanto*, 1996)

Sary2: founded by a female from *Sary*

1999:

Borety(=?): not known

2000:

Diane 2: founded by a female from *Diane*

Enafa2: founded by a female from *Enafa*

Mahagaga (=very surprising): a surprising assembly of individuals not seen for a long time

Sarivady2: founded by a female from *Sarivady*

2001:

Merrill: named for Merrill Baker, an undergraduate at Smith College in the US, who did a project at Bezà

Zavmad2: founded by a female from *ZavamaniryMadamo*

2002:

None named

2003:

Gobera2: founded by a female from *Gobera*

Miandry (=to wait): named for Miandry, one of the MNP staff helping with captures

Rarich: named for Rich Lawler

2004:

Felix2: founded by a female from *Felix*

Jacky: named for Jacky Youssouf, monitoring team coordinator at the time

Nenibe2: founded by a female from *Nenibe*

2005:

None named

2006:

Enafa3: came out of *Enafa/Enafa 2*

2007:

None named

2008:

Tahina: the name of Jeannin Ranaivonasy's elder son

2009:

Andry: named for Andry Andrianandrasana, Madagascar National Parks Director of the Reserve

2010:

Efitiria: named for Efitiria, a member of the monitoring team

2011:

Heriniainy: named for Joel Ratsirarson's elder son, who helped with the capturing program