Analysis of Road Kill Data from Ankarafantsika National Park, Madagascar

by
Phillip Schutt
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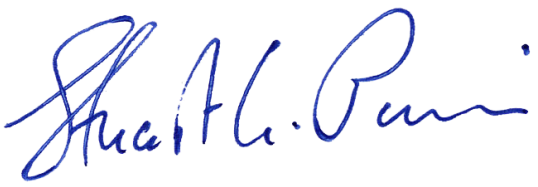

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Dr. Stuart Pimm, Advisor

Masters project submitted in partial fulfillment of the requirements for the Master of Environmental Management degree in the Nicholas School of the Environment and Earth Sciences of Duke University

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Abstract:

Ankarafantsika National Park, one of the largest and last remaining sections of dry deciduous forest in Madagascar, is filled with critically endangered and endemic species. A major highway bisects the park. Road kill continues to be a problem facing park management. In 2007 two speed bumps were constructed along the highway system inside the park. While it is assumed that speed bumps decrease incidence of road kill by slowing vehicles, no studies have conclusively determined that speed bumps protect wildlife. This project analyzes data collected from 2005 to 2007 to determine if speed bumps reduced the amount of road kill inside the park. The speed bumps were found to substantially reduce the amount of road kill across all faunal classes. The fact that reductions in road kill occurred along the entire road suggests that the speed bumps might act as psychological deterrent as well as a physical obstacle.

Introduction:

Madagascar

As the world's fourth-largest island, Madagascar represents a variety of climates. There are tropical wet forests on the east coast, tropical dry forests on the west coast, temperate savannahs in the interior and arid regions in the south (Figure 1). The variety of ecosystems in the country serve as a refuge for many rare plants and animals; almost eighty percent of Madagascar's flora are endemic (Hart and Hart, 2006) with a similar faunal endemic rate.

The unique biota of Madagascar is severely threatened by deforestation. Slash-and-burn agriculture and animal grazing are common throughout the country (Luke Dollar, personal comm.). Forests are also threatened by industrial charcoal production (Seddon Butchart et al., 2000). While forest historically covered the country, today less than ten percent of original forest remains (Myers Mittermeier et al., 2000). The combination of high endemicity and loss of habitat makes Madagascar one of the world's top biodiversity conservation priorities (Goodman and Patterson, 1997).

Dry forests are the most distinct yet least protected ecosystems of Madagascar (Seddon Butchart et al., 2000). While tropical dry forests in Madagascar once covered an area arguably larger than the tropical moist forests, the dry forests are currently disappearing at a faster rate than the moist forests (Sussman and Rakotozafy, 1994; Whitmore, 2000); by 1990, only three percent of original tropical dry forest remained (Smith, 1997). Because of deforestation, the western and southern forests of Madagascar are now extremely fragmented (Sussman and Rakotozafy, 1994; Ganzhorn Fietz et al., 1999; Ganzhorn Lowry et al., 2001).

Malagasy Protected Areas

In recent years, Madagascar has shown a strong initiative toward the protection and conservation of Malagasy ecology. Until the late 1980s, conservation in Madagascar was dispersed between various groups, making it inefficient and ineffective (Dollar 2006). In 1990, the Malagasy government formed the National Association for the Management of Protected Areas (ANGAP) for the purposes of unifying conservation efforts. Now considered a public utility, ANGAP oversees forty-six parks and reserves

throughout the country (Figure 2). With approximately seventeen thousand square kilometers already protected, the president of Madagascar announced in 2003 an initiative to triple the area under protection to around sixty thousand square kilometers.

Ankarafantsika National Park

As the largest contiguous tropical dry forest in Madagascar, Ankarafantsika National Park is considered to be one of the premier examples of dry forest in the country. Located in the north-west of Madagascar, the park holds approximately 100,000 to 200,000 hectares of tropical dry forest (Nicoll and Langrand, 1989; ANGAP, 2000; Alonso and Hannah, 2002; Dollar, 2006).

Ankarafantsika National Park (hereafter referred to as ANP) consists of dense deciduous dry tropical forest mixed with secondary degraded forest thicket (ANGAP, 2000). Savannah ecosystems surround the main body of tropical dry forest and are interspersed among the smaller forest patches (Bloesch, 1999). While rain is not scarce, the forest grows on sandy soil with low water and nutritional holding capacities (Rendigs Radespiel et al., 2003); this leads to large runoffs of water which are used by Malagasy people for growing rice (ANGAP, 2000; Dollar, 2006). In fact, the plain north of ANP is the second-largest rice-growing region in the country (Bloesch, 1999).

Because of its contiguous forest structure, ANP is home to many rare and endemic species, some which are found nowhere else in Madagascar. For example, the Mongoose lemur (*Eulemur mongoz*) can only be found in ANP (Dollar, 2006). ANP is floristically heterogeneous and includes baobab trees, palisandre, and orchids. One can even find *Raffia* palms in the valleys that are dispersed through the dry forest (García and

Goodman, 2003; Dollar, 2006). The park is considered to be a high-priority site for the conservation of Malagasy wildlife (Smith et al., 1997).

ANP was established in 1927 as an "Integrated National Reserve." In 1990, it was considered to be a protected area with high eco-tourism potential, and Conservation International was placed in charge of the Integrated Conservation and Development Program (ICDP) for ANP (Dollar, 2006). From 1990 to 2000, while under the control of CI, ANP lost almost twenty percent of its original forest cover (Dollar, 2006). It is believed that this forest loss was due to poor management from Conservation International, who placed their center of management operations 120 kilometers away from the park (Dollar, 2006). In 2000, ANGAP was placed in control of ANP, and deforestation decreased.

Even though the issue of poor management appears to be resolved, the biodiversity at ANP is still highly threatened. Illegal logging and slash-and-burn agriculture continue to cause deforestation (Dollar, 2006). A study found that illegal hunting for bush-meat is reducing the populations of critically endangered species (García and Goodman, 2003). Domesticated animals continue to predate on many species in the park, leading to reduced populations (García and Goodman, 2003; Dollar, 2006).

Another threat to wildlife in ANP stems from the existence of Route Nationale 4, a paved road that bisects the park (Figure 3). This has the benefit of allowing for ecotourism. However, the road also poses many hazards. Taxis brousse speed through the park in excess of 100 kilometers per hour, putting wildlife and local people at risk (Luke Dollar, personal comm.). Because of this, road kill (both human and faunal) has

become an increasing problem in the park (Dollar, 2006). In an attempt to mitigate the damage, the park recently constructed two speed bumps in ANP, located on either side of the tourist station (Figure 3). These speed bumps are approximately two meters wide and fourteen inches high with a gentle slope. The speed bumps extend off the side of the road to prevent avoidance. The size and shape of these speed bumps require that all vehicles go less than five kilometers per hour in order to safely proceed. A major goal of this project is to determine the impact that these speed bumps have on the level of road kill along RN4 inside the borders of ANP.

Road Kill Management

Many studies have examined the impact of road kill on wildlife populations (e.g Gibbs, 2005 and Simek, 2005) and its management through the use of barriers and culverts (Dodd, 2004). Second-hand reports suggest that speed bumps and rumble strips were installed in Australia and Florida respectively to prevent road kill (Huijser Kociolek et al., 2007). However, the author found no existing scientific studies testing the effectiveness of speed bumps in reducing levels of road kill.

Methods:

Between 2005 and 2007, Dr. Luke Dollar, through the use of Malagasy staff or EarthWatch volunteers, collected 46 days of road kill data in ANP on 4 separate field expeditions. While the personnel collecting data varied between and amidst data sets, the methodology of the data collection was consistent throughout the data sets. On the day before data collection began, researchers walked the segment of RN4 inside the park,

shoveling any existing road kill to the side of the road. Every subsequent day until the end of the study, researchers walked the entire length of the road, recording the time and location of each incidence of road kill along with the highest possible level of species identification. At each instance of road kill, researchers shoveled the road kill to the side of the road to prevent data replication. This method ensured an accurate daily estimate of road kill.

The researchers collected four data sets; a June/July census in 2005, a June census in 2006, a March census in 2007 and a July census that same year. Because of the large differences in species numbers between the wet and dry season at ANP, the author did not analyze the March 2007 data set. While many of the data points occurred in the same two months, there was no overlap in dates amongst the data points (Figure 4). The author collated the remaining data points (452 in total) and converted them into a universal format to allow for comparisons between data sets. Researchers identified road kill to varying degrees of detail; the major analyses of this project occur at the Class level of the Linnean taxonomic hierarchy. Authorities installed speed bumps in Ankarafantsika National Park in late 2006 and early 2007 (Luke Dollar, personal comm.). Thus, there are data for two years before and one year after their installation.

Results and Discussion:

The data sets from 2005 and 2006 confirm that road kill is an issue in ANP. There were a total of 109 incidents of road kill recorded in 2005 and 266 road kill incidents recorded in 2006, amounting to kills/day rates of 6.4 and 29.6 respectively (Figure 5). The large level of amphibian road kill in 2006 is most likely explained by seasonality or

unusual weather phenomena. Researchers collected the 2006 data closer to the wet season; however, a few weeks' difference is unlikely to explain all the variance. Any unusually high level of precipitation would have been recorded by a local weather station; a future study could collect this weather data and test for a correlation between precipitation and road kill levels.

Amphibians and reptiles were the most commonly involved classes in 2005 and 2006 road kill incidents. This is expected, as the majority of terrestrial species in ANP fall into these categories. Researchers recorded the most taxonomic detail in 2005; a chart of the various species emphasizes the level of biodiversity in the park (Figure 6). This big-eyed snake *Mimophis mahafalensis* dominated the incidents of road kill in 2005. While very little is known about the species, its presence in the data reflects very high densities throughout ANP (Luke Dollar, personal comm.).

There is a stark contrast when the 2007 data is compared to the average data values between 2005 and 2006 (Figure 7 and Figure 8). The rate of road kill was substantially lower in 2007 than before the speed bumps were installed (7.7 kills/day versus 18 kills/day, respectively), and the reduction in road kill occurred across animal classes. Spatially, rates of road kill were greatly reduced not only between the speed bumps, but also outside the direct influence of the speed bumps. This suggests that the speed bumps could have had a psychological influence on drivers, whether as a scare tactic or as a reminder for good behavior.

To determine if additional speed bumps could further reduce rates of road kill, the change in rates of road kill since the construction of the speed bumps was categorized into two groups: between the speed bumps and outside the speed bumps (Figure 9). The

percent differences in rates of road kill since the construction of speed bumps were similar between the two categories (a 56% reduction in road kill between the speed bumps versus a 58% reduction outside of the speed bumps). Therefore, it seems unlikely that additional speed bumps would further decrease the amount of road kill along Route Nationale 4 in ANP.

Because this project is in the first stages of development, inconsistencies in the data could have led to error in the findings. The collection dates did not coincide from year to year; therefore, the average rates of road kill between 2005 and 2006 can only serve as a rough estimate of the levels of road kill before the construction of the speed bumps. There was also little standardization in the recording of data; when plotting the rates of road kill spatially, many data entries had to be removed due to lack of detailed information (e.g. rather than recording a mile marker, the researcher would write 'at the bend before the final bridge'). More taxonomic detail in future years of data collection could allow for more analyses of the impact on certain species.

Further collection of road kill data could lead to many new insights on how road traffic is affecting the biodiversity at ANP. Due to the strong seasonality in the park, ten days of data collection every month throughout the year would give the most reliable estimates of total road kill levels. Comparing this data to weather data could lead to further understanding about how biodiversity at ANP behaves during the year. This information could then be used to further reduce the amount of human impact in the park.

Source and Amount of Support: The data were collected through the work of Dr. Luke Dollar as part of an ongoing research project. No additional materials or financial support was needed to fulfill the objectives of this project.

Faculty: Dr. Luke Dollar of Pfeiffer University is serving as a cooperator on this project. Dr. Stuart Pimm of Duke University is the primary advisor.

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Appendix

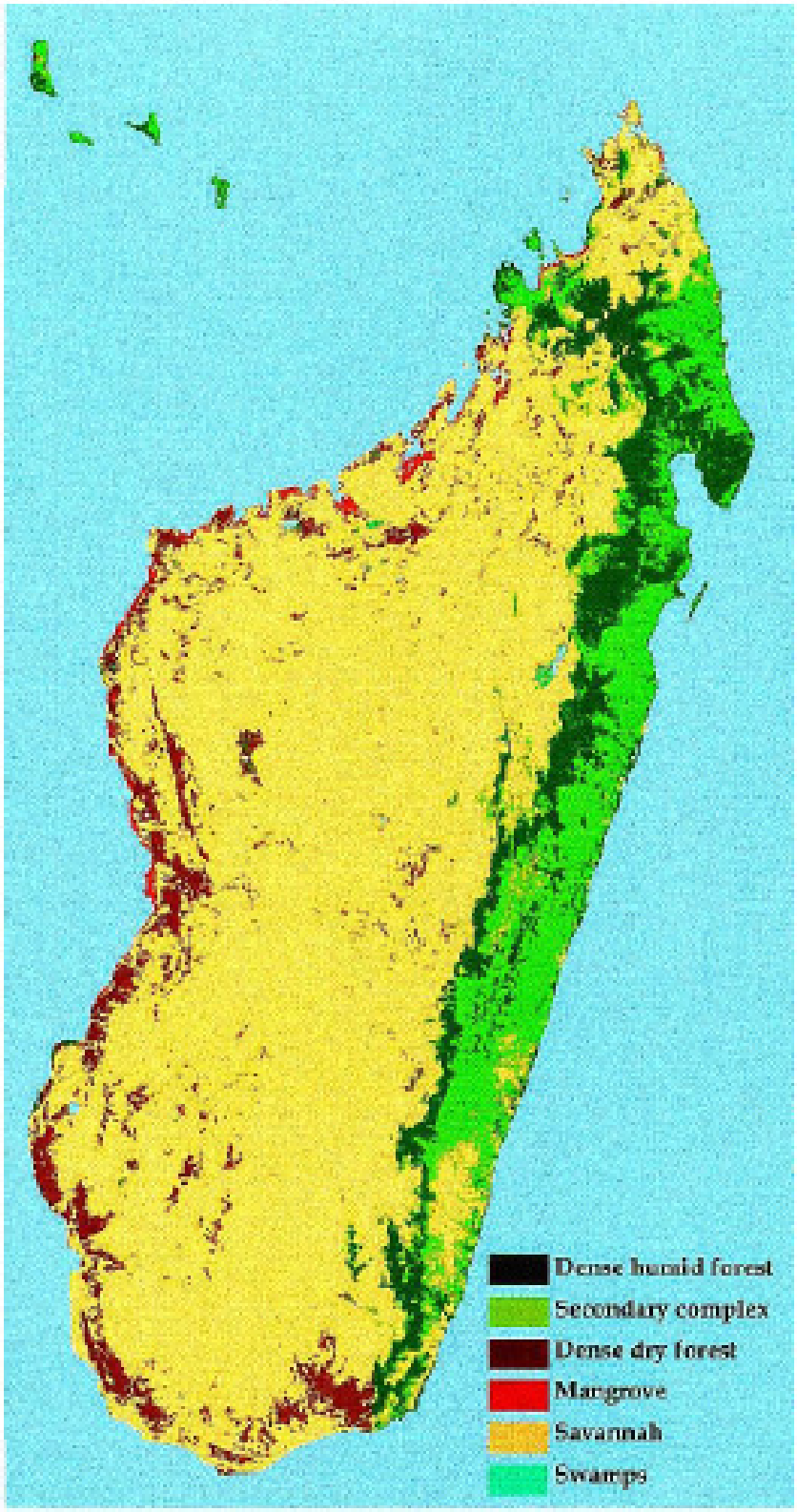

Figure 1: A map of the ecosystems of Madagascar (Mayaux, Gond et al. 2000)

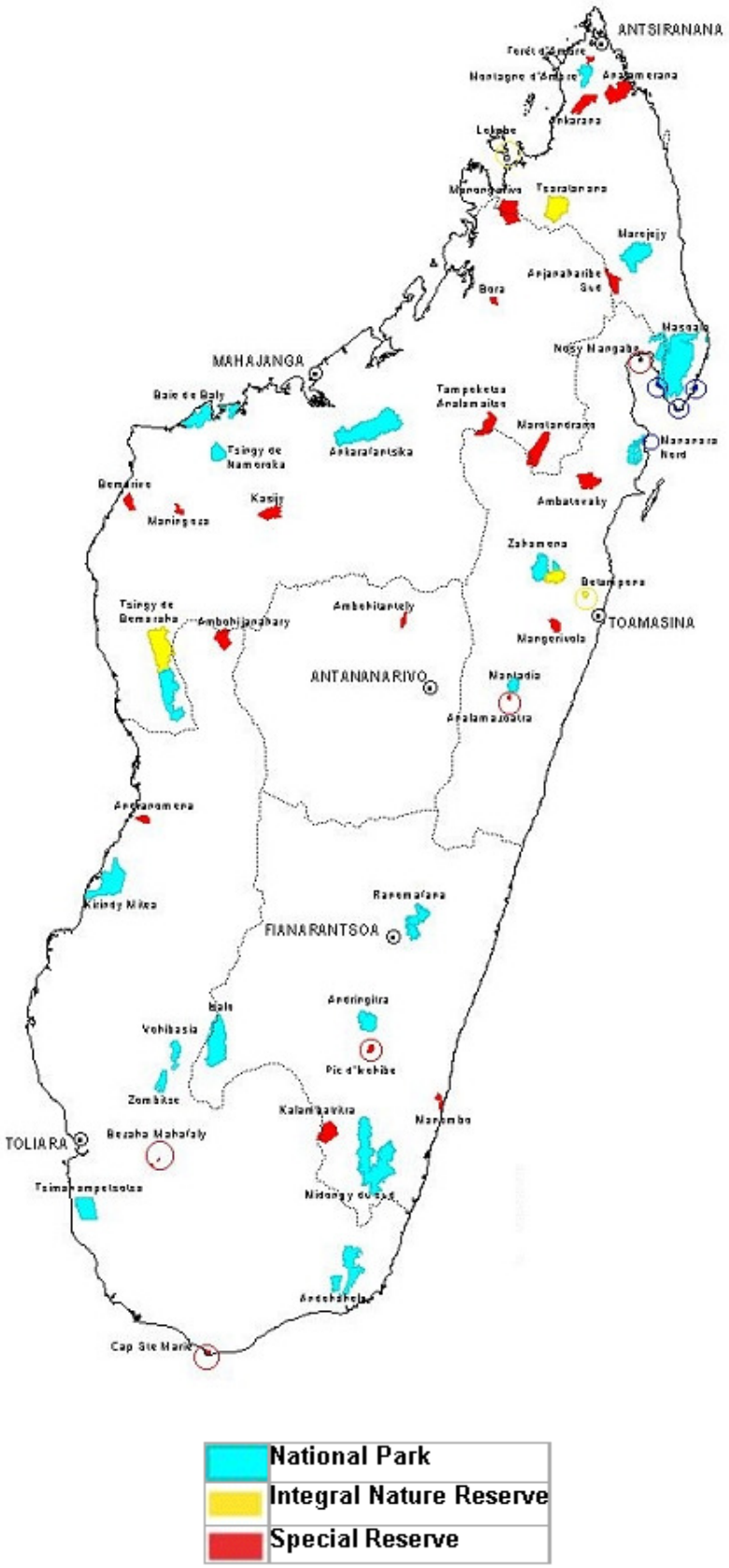

Figure 2: A map of Protected Areas in Madagascar (ANGAP 2000).

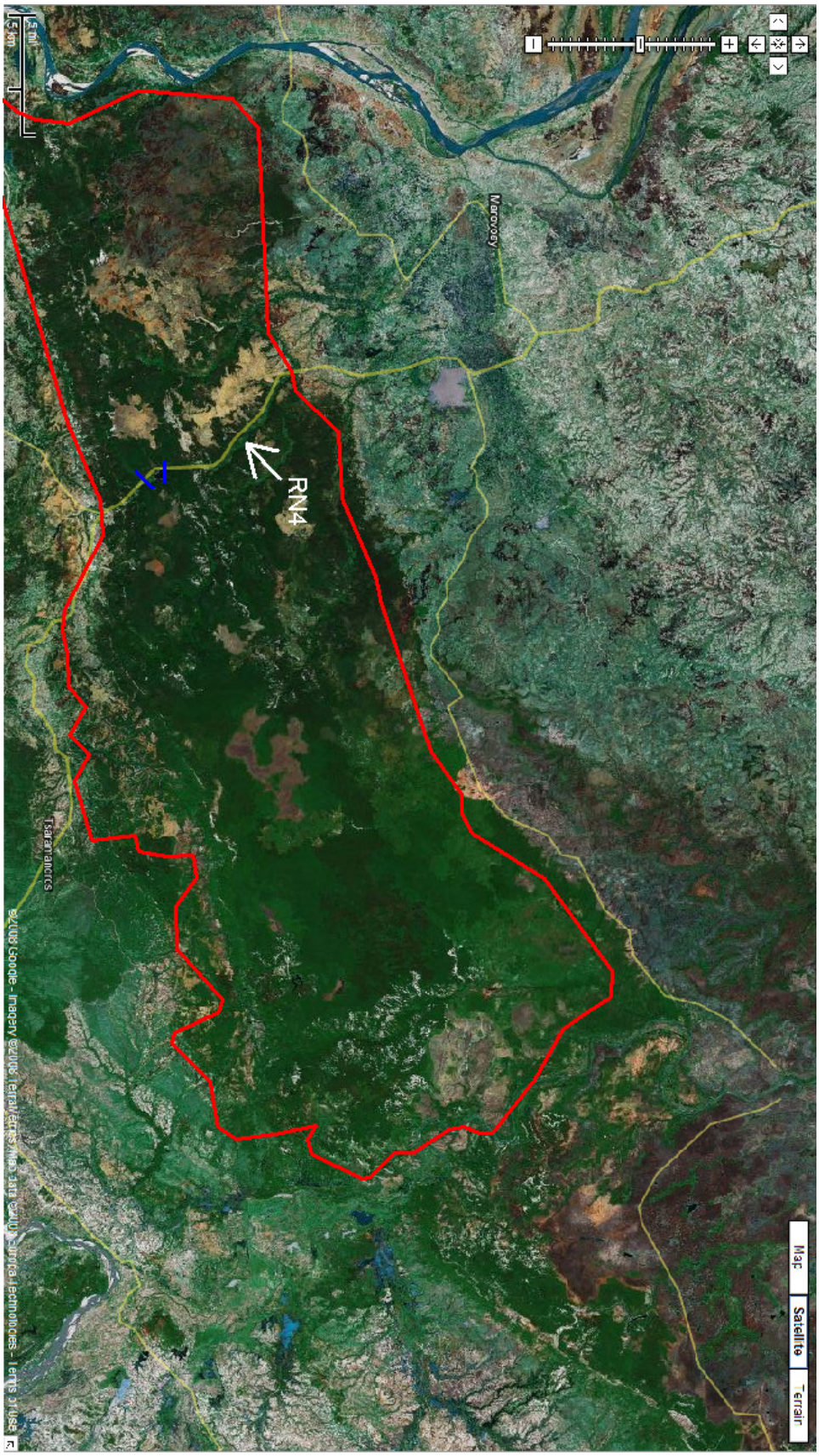

Figure 3: Map of RN4 passing through ANP. Red outline represents the approximate boundary of the park, yellow lines represent roads, and blue lines indicate approximate placement of the speed bumps. Map courtesy of Google Maps.

Data Set	# of Days	Start Date	End Date
2005	17	June 25	July 16
2006	9	June 11	June 19
March 2007	5	March 19	March 23
July 2007	10	July 20	July 29

Figure 4: Temporal distribution of data points.

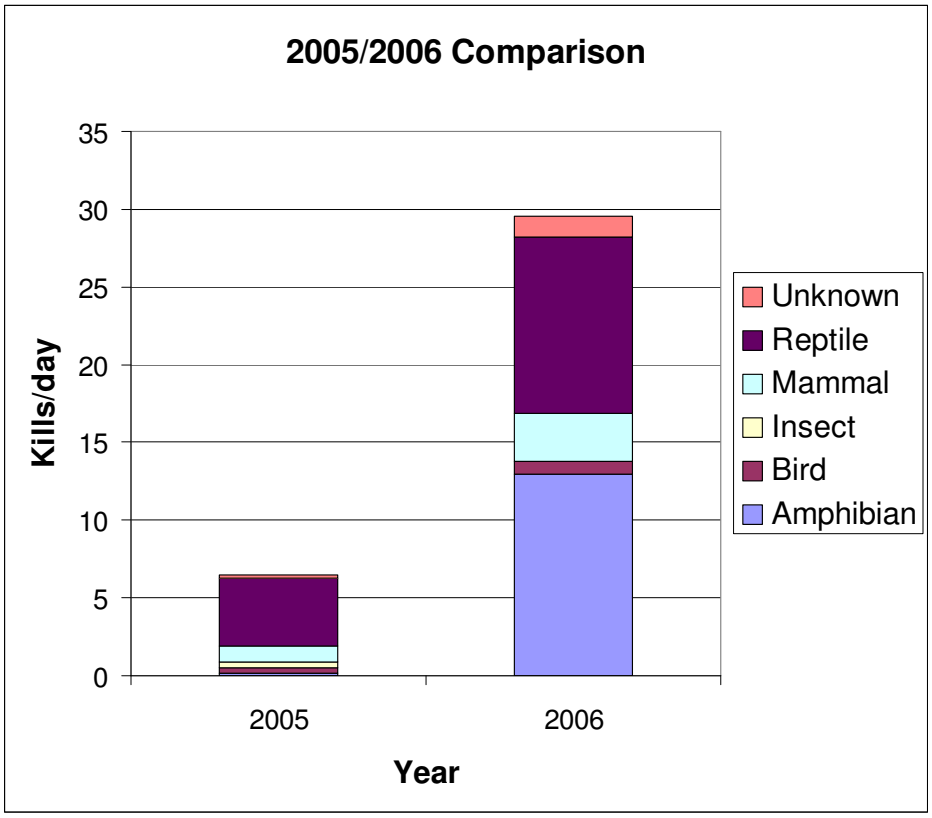

Figure 5: Counts and Class distributions of 2005 and 2006 data.

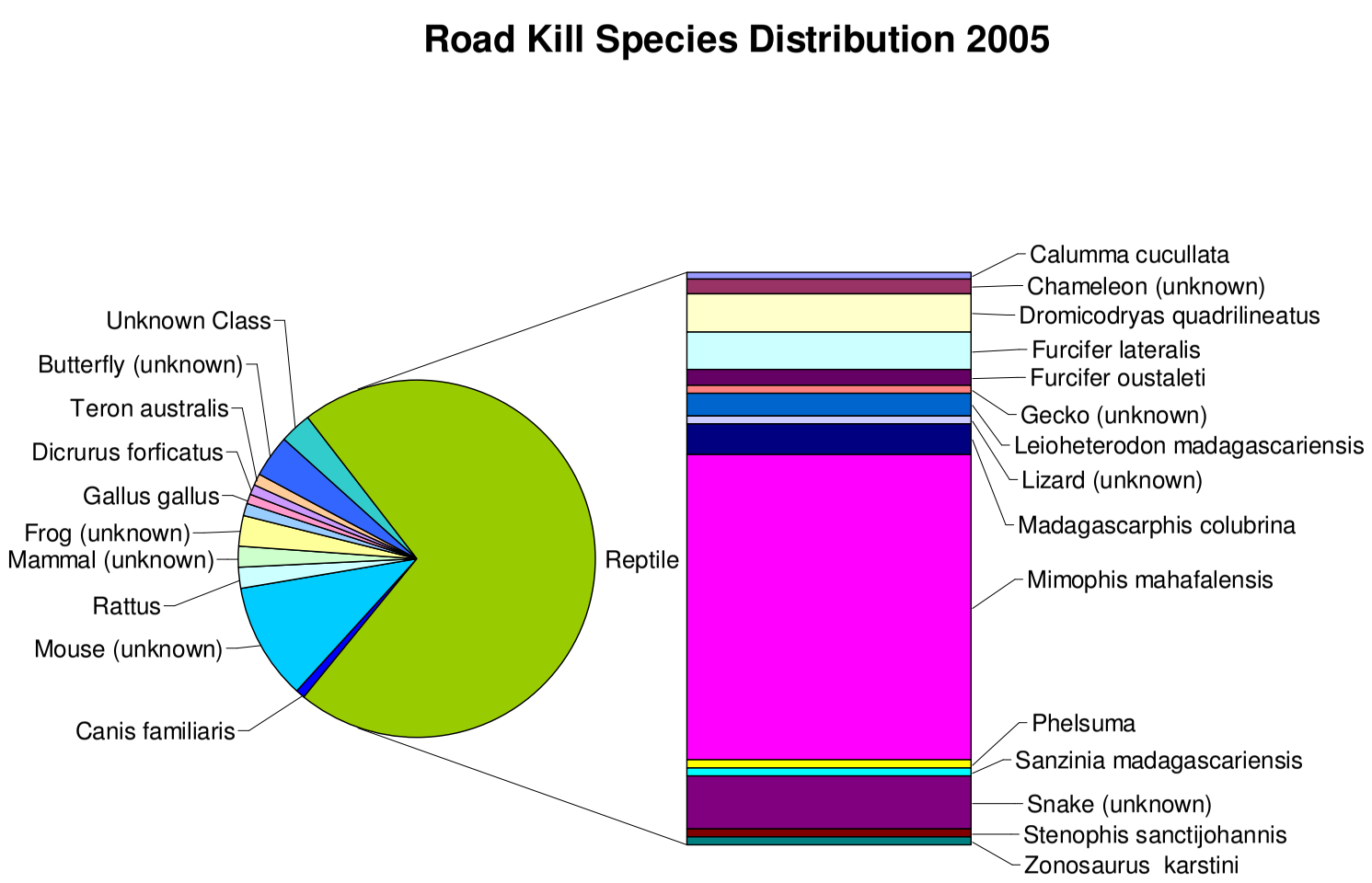

Figure 6: Species Distribution of Road Kill in ANP from June 25 to July 16, 2005.

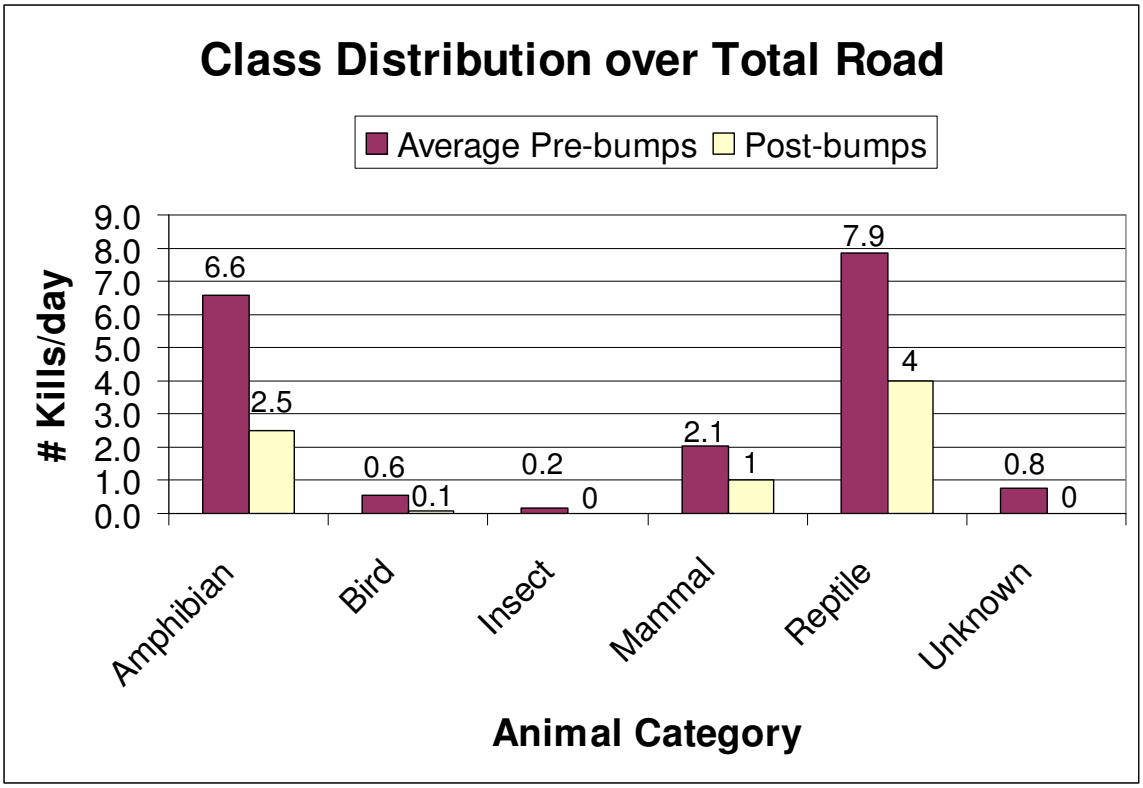

Figure 7: Comparison of levels of road kill by Class in ANP between the pre-speed bump data and the post-speed bump data.

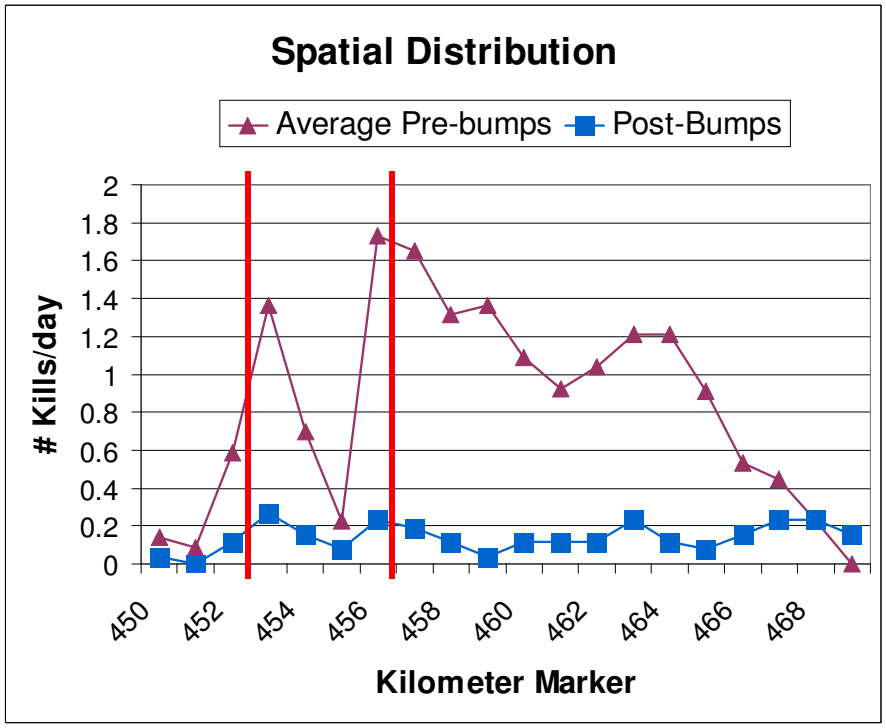

Figure 8: Comparison of spatial distributions of road kill in ANP between the pre-speed bump data and the post-speed bump data. Red lines indicate approximate location of speed bumps.

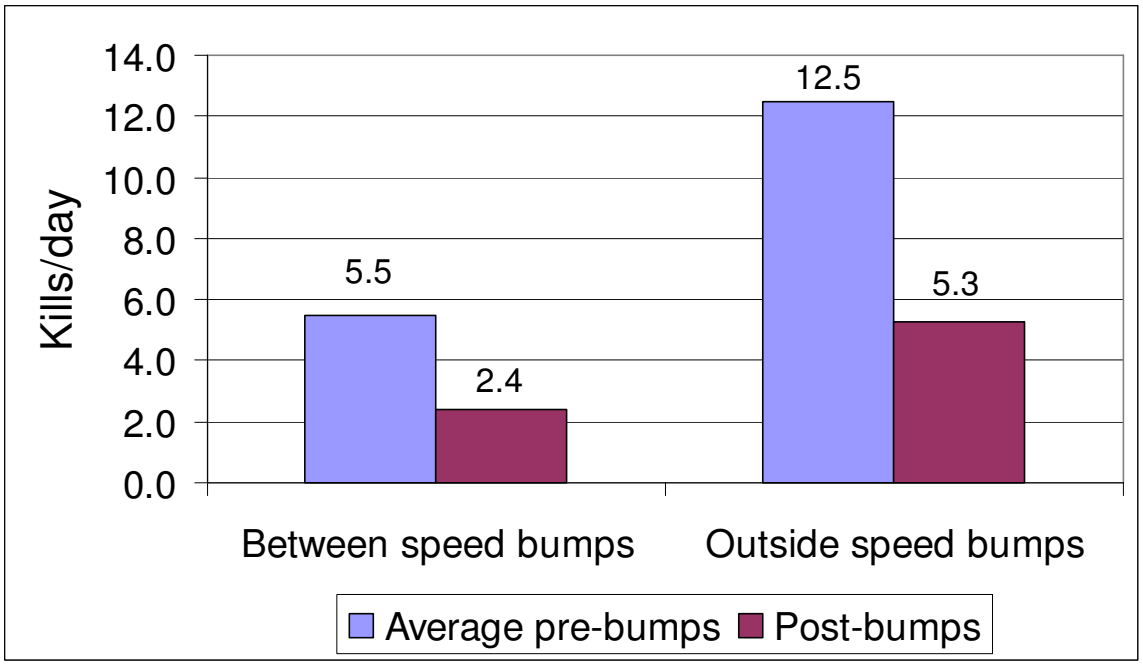

Figure 9: Comparison of road kill numbers between the speed bumps versus elsewhere along the road.

Raw Data

Date	Time	Location	ID	Scientific Name	Number	Comments
6/25/2005	16:26				1	
6/26/2005	15:10	entrance of ?	snake	unknown	1	
6/26/2005	15:21	1km before JBB	snake	Leioheterodon madagascariensis	1	
6/26/2005	15:45	?	snake	Leioheterodon madagascariensis	1	
6/26/2005	17:31	?	snake	Leioheterodon madagascariensis	1	
6/27/2005	20:04	located at sign "Touenant Ankerika" Akarafantsika Befotcana	snake	Madagascarphis colubrina	1	fresh
6/28/2005	10:10	461	snake	Sanzinia madagascariensis	1	fresh
6/28/2005	11:04	464	snake	Mimophis mahafalensis	1	old
6/28/2005	11:25	466	snake	Mimophis mahafalensis	1	old
6/29/2005	11:10	Betoloana	dog	unknown	1	fresh
6/29/2005	11:40		frog	unknown	1	old
6/29/2005	11:40		snake	Mimophis mahafalensis	1	fresh
6/30/2005	7:46	Betoloana	mouse	unknown	2	
6/30/2005	10:00	459	snake	Mimophis mahafalensis	1	
6/30/2005	11:46	456.5	lizard	Stenophis sanctijohannis	1	
6/30/2005	11:57	at JBB	frog	unknown	1	
6/30/2005	12:39	our entrance	chameleon	Calumana cucullata	1	
6/30/2005	12:53	our entrance	frog	unknown	1	
6/30/2005	10:30?	camp entrance	chameleon	Furcifer lateralis	1	
7/1/2005	8:32	462.5	mouse	unknown	5	
7/1/2005	9:55	456	snake	Mimophis mahafalensis	1	
7/2/2005	8:16	464.5	chameleon	unknown	1	
7/2/2005	8:25	464.5	gecko	Phelsuma	1	Day Gecko
7/2/2005	8:28	463.5	lizard	Zonosaurus karstini	1	
7/2/2005	8:40	463.5	snake	Madagascarphis colubrina	1	
7/2/2005	8:45	463.5	snake	Mimophis mahafalensis	1	
7/2/2005	8:58	462.5	mouse	unknown	1	
7/2/2005	9:00	462.5	snake	Mimophis mahafalensis	1	
7/2/2005	9:00	462.5	snake	Mimophis mahafalensis	1	
7/2/2005	9:05	461.5	snake	Mimophis	1	

				mahafalensis		
7/2/2005	9:40	457.5	snake	unknown	1	
7/2/2005	11:43	just before bend before final bridge	chameleon	Furcifer oustaleti	1	
7/3/2005	8:15	465.6	bird	chicken	1	
7/3/2005	8:23	465.2	snake	unknown	1	
7/3/2005	8:33	464.8	chameleon	Furcifer lateralis	1	
7/3/2005	8:36	464.75	lizard	unknown	1	
7/3/2005	8:38	464.75	snake	Mimophis mahafalensis	1	
7/3/2005	8:48	464.2	unknown	unknown	1	
7/3/2005	8:50	464.1	snake	unknown	1	
7/3/2005	9:11	462.8	mouse	unknown	1	
7/3/2005	9:29	461.9	unknown	unknown	1	
7/3/2005	9:52	460.1	unknown	unknown	1	
7/3/2005	9:59	459.7	mammal	unknown	1	fur, no bones
7/3/2005	10:07	459.2	rat	Rattus	1	
7/3/2005	10:46	456.9	bird	unknown	1	
7/3/2005	10:56	456.3	gecko	unknown	1	
7/3/2005	11:23	454.5	dog	unknown	1	
7/3/2005	12:08	451.5	bird	Dicrurus forficatus	1	
7/4/2005	9:02	462	snake	Mimophis mahafalensis	1	
7/4/2005	10:34	458	snake	Mimophis mahafalensis	1	
7/4/2005	12:11	our entrance	snake	Dromicodryas quadrilineatus	1	
7/4/2005	12:35	451	snake	Mimophis mahafalensis	1	
7/9/2005	7:48	466.5	snake	Madagascarphis colubrina	1	
7/9/2005	7:55	465.25	snake	Mimophis mahafalensis	1	
7/9/2005	8:05	465.125	snake	unknown	1	
7/9/2005	8:05	465.5	snake	Mimophis mahafalensis	1	
7/9/2005	8:50	464.125	snake	Dromicodryas quadrilineatus	1	
7/9/2005	8:55	463.5	snake	Mimophis mahafalensis	1	
7/9/2005	9:08	460.5	chameleon	Furcifer lateralis	1	
7/9/2005	9:15	462.5	mammal	unknown	1	
7/9/2005	9:27	461.5	snake	Mimophis mahafalensis	1	
7/9/2005	9:50	457	bird	Teron australis	1	
7/9/2005	9:52	457	snake	Mimophis mahafalensis	1	
7/9/2005	10:00	456.5	chameleon	Furcifer lateralis	1	
7/9/2005	10:02	456.5	snake	Mimophis mahafalensis	1	
7/9/2005	10:07	458	snake	Mimophis mahafalensis	1	

7/9/2005	10:50	456	snake	Mimophis mahafalensis	1	
7/9/2005	10:55	455.875	chameleon	Furcifer lateralis	1	
7/9/2005	11:22	454.125	snake	Mimophis mahafalensis	1	
7/9/2005	11:45	453.5	snake	Dromicodryas quadrilineatus	1	
7/11/2005	8:30	465	snake	Mimophis mahafalensis	1	
7/11/2005	8:34	465.25	snake	Mimophis mahafalensis	1	
7/11/2005	9:09	462	snake	Mimophis mahafalensis	1	
7/11/2005	9:38	460	snake	Dromicodryas quadrilineatus	1	
7/11/2005	10:01	458	snake	Madagascarphis colubrina	1	
7/11/2005	11:02	454	snake	Mimophis mahafalensis	1	
7/12/2005	7:50	468	snake	Mimophis mahafalensis	1	
7/12/2005	8:10	467	snake	Mimophis mahafalensis	1	
7/12/2005	8:30	465	snake	Mimophis mahafalensis	1	
7/12/2005	8:50	465	snake	Mimophis mahafalensis	1	
7/12/2005	9:45	462	snake	Mimophis mahafalensis	1	
7/12/2005	12:20	453	snake	unknown	1	brown
7/12/2005	12:50	452	snake	unknown	1	
7/13/2005	11:17	450	chameleon	unknown	1	
7/13/2005	12:06	452	butterfly	unknown	1	
7/13/2005	13:01	457	snake	Mimophis mahafalensis	1	
7/13/2005	15:05	459	snake	Mimophis mahafalensis	1	
7/13/2005	16:04	464	butterfly	Danaus plexippus	1	
7/13/2005	16:34	466	snake	Mimophis mahafalensis	1	
7/14/2005	7:50	467.5	mouse	unknown	2	
7/14/2005	8:12	465.5	snake	Mimophis mahafalensis	2	
7/14/2005	9:00	461.5	snake	Mimophis mahafalensis	1	
7/15/2005	8:46	466	butterfly	unknown	2	
7/15/2005	8:54	466	snake	Mimophis mahafalensis	1	
7/15/2005	9:41	464	chameleon	Furcifer oustaleti	1	
7/15/2005	9:44	464	moth	unknown	1	
7/15/2005	10:16	463	snake	Mimophis mahafalensis	1	
7/15/2005	11:01	461	snake	Dromicodryas quadrilineatus	1	
7/15/2005	11:01	461	insects	various	multiple	

7/16/2005	8:20		468	snake	Mimophis mahafalensis	1	
7/16/2005	11:25		458	butterfly	unknown	1	black with white spots
7/16/2005	12:00		455	rat	Rattus	1	
6/11/2006	8:38		459.5	snake	Mimophis mahafalensis	1	
6/11/2006	8:40		459.5	snake	Leioheterodon madagascariensis	1	
6/11/2006	8:45		459.5	chameleon	Furcifer	1	
6/11/2006	8:10		462	snake	Mimophis mahafalensis	1	
6/11/2006	7:47		464	snake	Mimophis mahafalensis	1	
6/11/2006	7:40		464.5	mammal	mouse	1	
6/11/2006	7:42		464.5	snake	Mimophis mahafalensis	1	
6/11/2006	7:15		466	snake	Mimophis mahafalensis	1	
6/11/2006	9:35	camp		chameleon	unknown	1	
6/11/2006	10:35	camp		chameleon	unknown	1	
6/12/2006	15:30		451.5	snake	unknown	1	
6/12/2006	15:05		452	frog	unknown	1	
6/12/2006	12:30		453.2	mammal	mouse (mus)	1	
6/12/2006	12:22		453.3	snake	Mimophis mahafalensis	1	
6/12/2006	12:24		453.3	lizard	skink	1	
6/12/2006	12:14		453.4	frog	unknown	1	
6/12/2006	12:14		453.4	mammal	unknown	1	
6/12/2006	12:15		453.4	frog	unknown	1	
6/12/2006	12:15		453.4	frog	unknown	1	
6/12/2006	12:16		453.4	unknown	unknown	1	
6/12/2006	12:10		453.5	reptile	unknown	1	
6/12/2006	12:00		454	snake	Mimophis mahafalensis	1	
6/12/2006	12:01		454	frog	unknown	1	
6/12/2006	11:35		455.5	snake	Mimophis mahafalensis	1	
6/12/2006	11:25		456.1	chameleon	unknown	1	
6/12/2006	11:15		456.4	reptile	iguana	1	
6/12/2006	11:17		456.4	mammal	unknown	1	
6/12/2006	11:13		456.5	lizard	unknown	1	
6/12/2006	11:09		456.6	frog	unknown	1	
6/12/2006	11:11		456.6	mammal	unknown	1	
6/12/2006	11:04		456.8	mammal	unknown	1	
6/12/2006	10:55		457	frog	unknown	1	
6/12/2006	10:54		457.5	bird	unknown	1	
6/12/2006	10:50		457.8	mammal	unknown	1	
6/12/2006	10:40		458.2	reptile	unknown	1	
6/12/2006	10:26		458.8	amphibian	unknown	1	
6/12/2006	10:21		458.9	amphibian	unknown	1	
6/12/2006	10:21		458.9	frog	unknown	1	

6/12/2006	10:15		459	frog	unknown	1
6/12/2006	10:17		459	mammal	unknown	1
6/12/2006	10:17		459	frog	unknown	1
6/12/2006	10:20		459	reptile	unknown	1
6/12/2006	10:20		459	amphibian	unknown	1
6/12/2006	10:10		459.1	unknown	unknown	1
6/12/2006	10:11		459.1	mammal	mouse (mus)	1
6/12/2006	9:55		459.9	bird	unknown	1
6/12/2006	9:44		460.4	snake	Mimophis mahafalensis	1
6/12/2006	9:38		460.6	frog	unknown	1
6/12/2006	9:38		460.6	chameleon	unknown	1
6/12/2006	9:39		460.6	unknown	unknown	1
6/12/2006	9:30		461	unknown	unknown	1
6/12/2006	9:24		461.1	frog	unknown	1
6/12/2006	9:20		461.2	bird	unknown	1
6/12/2006	9:12		461.4	lizard	skink	1
6/12/2006	9:06		461.6	mammal	mouse (mus)	1
6/12/2006	9:04		461.7	lizard	unknown	1
6/12/2006	9:00		461.8	snake	unknown	1
6/12/2006	9:00		461.8	mammal	mouse	1
6/12/2006	8:50		462.4	snake	Mimophis mahafalensis	1
6/12/2006	8:44		463	unknown	unknown	1
6/12/2006	8:40		464	chameleon	Furcifer	1
6/12/2006	8:41		464	snake	Mimophis mahafalensis	1
6/12/2006	8:00		464.5	mammal	mouse (mus)	1
6/12/2006	7:41		465	snake	Mimophis mahafalensis	1
6/12/2006	7:03		466.5	snake	Leioheterodon madagascariensis	1
6/13/2006	9:50		452.2	frog	unknown	1
6/13/2006	10:00		452.3	snake	Mimophis mahafalensis	1
6/13/2006	9:03		458.1	frog	unknown	1
6/13/2006	8:10		460.5	snake	Mimophis mahafalensis	1
6/13/2006	8:11		460.6	frog	unknown	1
6/13/2006	8:24		460.8	snake	Mimophis mahafalensis	1
6/13/2006	8:05		461	frog	unknown	1
6/13/2006	7:50		464.5	snake	Mimophis mahafalensis	1
6/13/2006	7:38		465.5	snake	Mimophis mahafalensis	1
6/13/2006	7:41		465.9	snake	Mimophis mahafalensis	1
6/13/2006	7:27		466.8	snake	Leioheterodon modestus	1
6/13/2006	7:15		467.5	snake	Mimophis mahafalensis	1
6/13/2006	6:59	<500		snake	Mimophis	1

					mahafalensis	
6/13/2006	6:59	<500		snake	Mimophis mahafalensis	1
6/13/2006	9:47	at camp entrance		frog	unknown	1
6/13/2006	9:23	NR Lake		snake	Mimophis mahafalensis	1
6/14/2006	9:10		455.5	frog	unknown	14
6/14/2006	9:05		456	snake	Leioheterodon	1
6/14/2006	8:55		461.5	snake	Leioheterodon	1
6/14/2006	7:20		463.1	snake	unknown	1
6/14/2006	7:15		463.4	frog	unknown	1
6/14/2006	7:08		463.9	mammal	rat	1
6/14/2006	7:09		463.9	mammal	mouse	1
6/14/2006	6:47		464.3	snake	Mimophis mahafalensis	1
6/14/2006	6:52		464.4	snake	Leioheterodon	1
6/15/2006	7:48		44.5	frog	unknown	1
6/15/2006	14:20		450	snake	Leioheterodon modestus	1
6/15/2006	12:28		450.7	lizard	unknown	1
6/15/2006	12:11		452.3	reptile	unknown	1
6/15/2006	12:11		452.3	mammal	unknown	1
6/15/2006	12:03		452.6	reptile	unknown	1
6/15/2006	11:56		452.8	frog	unknown	1
6/15/2006	11:57		452.8	frog	unknown	1
6/15/2006	11:46		453.1	frog	unknown	1
6/15/2006	11:50		453.1	mammal	unknown	1
6/15/2006	11:50		453.1	bird	unknown	1
6/15/2006	11:43		453.2	frog	unknown	2
6/15/2006	11:45		453.2	frog	unknown	1
6/15/2006	11:42		453.3	frog	unknown	3
6/15/2006	11:40		453.4	frog	unknown	1
6/15/2006	11:41		453.4	frog	unknown	1
6/15/2006	11:37		453.6	frog	unknown	1
6/15/2006	11:34		453.8	frog	unknown	2
6/15/2006	11:30		454	frog	unknown	1
6/15/2006	11:18		455.1	frog	unknown	1
6/15/2006	11:10		455.5	frog	unknown	1
6/15/2006	11:07		455.6	frog	unknown	1
6/15/2006	11:05		455.7	reptile	unknown	1
6/15/2006	10:56		456.1	frog	unknown	1
6/15/2006	10:56		456.1	frog	unknown	1
6/15/2006	10:57		456.1	frog	unknown	1
6/15/2006	10:55		456.2	reptile	unknown	1
6/15/2006	10:50		456.4	reptile	unknown	1
6/15/2006	10:46		456.6	frog	unknown	1
6/15/2006	10:46		456.6	reptile	unknown	1
6/15/2006	10:43		456.7	frog	unknown	2
6/15/2006	10:44		456.7	reptile	unknown	1
6/15/2006	10:40		456.8	frog	unknown	1

6/15/2006	10:34	457	snake	unknown	1
6/15/2006	10:35	457	reptile	unknown	1
6/15/2006	10:36	457	frog	unknown	1
6/15/2006	10:17	457.1	reptile	unknown	1
6/15/2006	10:18	457.1	unknown	unknown	1
6/15/2006	10:19	457.1	unknown	unknown	1
6/15/2006	10:30	457.1	frog	unknown	1
6/15/2006	10:32	457.1	bird	unknown	1
6/15/2006	10:28	457.2	frog	unknown	1
6/15/2006	10:29	457.2	frog	unknown	1
6/15/2006	10:26	457.3	frog	unknown	1
6/15/2006	10:24	457.4	frog	unknown	1
6/15/2006	10:25	457.4	frog	unknown	1
6/15/2006	10:25	457.4	frog	unknown	1
6/15/2006	10:20	457.5	frog	unknown	1
6/15/2006	10:23	457.5	reptile	unknown	1
6/15/2006	10:23	457.5	reptile	unknown	1
6/15/2006	10:12	457.7	frog	unknown	1
6/15/2006	10:12	457.7	reptile	unknown	1
6/15/2006	10:12	457.7	reptile	unknown	1
6/15/2006	10:08	457.8	frog	unknown	1
6/15/2006	10:05	458	reptile	unknown	1
6/15/2006	10:06	458	frog	unknown	1
6/15/2006	10:06	458	reptile	unknown	1
6/15/2006	9:52	458.5	snake	unknown	1
6/15/2006	9:50	458.6	snake	unknown	1
6/15/2006	9:45	458.8	frog	unknown	1
6/15/2006	9:45	458.8	snake	unknown	1
6/15/2006	9:45	458.8	frog	unknown	1
6/15/2006	9:41	459	frog	unknown	1
6/15/2006	9:28	459.5	reptile	iguana	1
6/15/2006	9:25	459.6	frog	unknown	1
6/15/2006	9:21	459.8	unknown	unknown	1
6/15/2006	9:22	459.8	frog	unknown	1
6/15/2006	9:23	459.8	frog	unknown	1
6/15/2006	9:17	459.9	frog	unknown	1
6/15/2006	9:15	460	reptile	unknown	2
6/15/2006	9:16	460	frog	unknown	1
6/15/2006	9:07	460.4	mammal	mouse	1
6/15/2006	9:04	460.5	frog	unknown	2
6/15/2006	9:05	460.5	frog	unknown	1
6/15/2006	8:38	462.2	reptile	unknown	1
6/15/2006	9:02	462.2	frog	unknown	1
6/15/2006	8:30	462.5	frog	unknown	1
6/15/2006	8:26	462.7	frog	unknown	1
6/15/2006	8:17	463.1	frog	unknown	3
6/15/2006	8:18	463.1	frog	unknown	2
6/15/2006	8:18	463.1	frog	unknown	1
6/15/2006	8:15	463.2	chameleon	unknown	1
6/15/2006	8:15	463.3	reptile	unknown	1

6/15/2006	8:05		463.8	frog	unknown	1	
6/15/2006	8:05		463.8	frog	unknown	1	
6/15/2006	7:55		464.2	frog	unknown	1	
6/15/2006	7:57		464.2	frog	unknown	1	
6/15/2006	7:58		464.2	reptile	unknown	1	
6/15/2006	7:49		464.4	frog	unknown	1	
6/15/2006	7:45		464.5	frog	unknown	1	
6/15/2006	7:47		464.5	frog	unknown	1	
6/15/2006	7:25		465.5	reptile	unknown	1	
6/15/2006	7:31		465.5	frog	unknown	1	
6/16/2006	10:22		450.2	snake	unknown	1	
6/16/2006	10:10		452.3	frog	unknown	1	
6/16/2006	9:54		454.9	mammal	hedgehog	1	
6/16/2006	9:22		456.2	frog	unknown	1	
6/16/2006	9:10		457.9	frog	unknown	1	
6/16/2006	8:57		459.2	frog	unknown	1	
6/16/2006	8:58		459.2	mammal	mouse	1	
6/16/2006	8:31		460.2	mammal	rat	1	
6/16/2006	7:50		463	lizard	unknown	1	
6/16/2006	7:58		463.5	snake	unknown	1	
6/16/2006	7:40		464.1	snake	unknown	1	
6/16/2006	7:48		464.9	mammal	mouse	1	
6/16/2006	7:33		465.9	snake	unknown	1	
6/16/2006	7:24		466.8	snake	unknown	1	
6/16/2006	7:05		467.1	unknown	unknown	1	
6/16/2006	7:01	at the ford		frog	unknown	1	
6/16/2006	6:55	first bridge		frog	unknown	1	
6/16/2006	6:58	first bridge	.5	mammal	rat	1	
6/17/2006	9:31		454	bird	chicken	1	
6/17/2006	9:34		454.1	snake	unknown	1	small black
6/17/2006	9:20		455	mammal	rat	1	
6/17/2006	8:32		459	snake	unknown	1	white & brown
6/17/2006	8:33		459	snake	unknown	1	white bottom black & brown checkered
6/17/2006	8:21		460.1	frog	unknown	1	
6/17/2006	8:22		460.1	frog	unknown	1	
6/17/2006	8:19		460.8	lizard	unknown	1	
6/17/2006	6:58	1st sign		snake	unknown	1	white & brown
6/18/2006	10:34		451.9	lizard	unknown	1	
6/18/2006	10:34		451.9	frog	unknown	1	
6/18/2006	10:27		453.7	frog	unknown	1	
6/18/2006	10:22		454	frog	unknown	1	
6/18/2006	10:03		456	lizard	unknown	1	
6/18/2006	9:49		456.5	unknown	unknown	1	
6/18/2006	9:32		457.5	frog	unknown	1	
6/18/2006	9:32		457.5	frog	unknown	1	

6/18/2006	9:33		457.5	frog	unknown	1
6/18/2006	9:33		457.5	mammal	unknown	1
6/18/2006	9:39		457.5	mammal	unknown	1
6/18/2006	9:27		458.1	mammal	mouse	1
6/18/2006	9:20		458.6	chameleon	unknown	1
6/18/2006	9:17		458.8	snake	unknown	1
6/18/2006	9:12		459	snake	unknown	1
6/18/2006	8:54		461.6	frog	unknown	1
6/18/2006	8:55		461.6	reptile	unknown	1
6/18/2006	8:55		461.6	unknown	unknown	1
6/18/2006	8:47		461.9	mammal	mouse	1
6/18/2006	8:42		462	snake	unknown	1
6/18/2006	8:22		463.1	unknown	unknown	1
6/18/2006	8:11		463.3	frog	unknown	1
6/18/2006	7:54		464	mammal	mouse	1
6/18/2006	7:50		465	bird	unknown	1
6/18/2006	7:30		466.9	snake	unknown	1
6/18/2006	7:27		467	snake	unknown	1
6/18/2006	7:22		467.3	reptile	unknown	1
6/18/2006	7:15		467.5	snake	unknown	1
6/19/2006	10:26		453	snake	Mimophis mahafalensis	1
6/19/2006	10:59		453	chameleon	unknown	1
6/19/2006	8:12		462	snake	Mimophis mahafalensis	1
6/19/2006	7:22		465.5	snake	unknown	1
6/19/2006	7:38		466	snake	leioheterodon	1
3/19/2007	7:12	1.670 K		Frog	Mantidactylus sp	1
3/19/2007	7:14	1.675 K		Lezard	Oplurus sp	1
3/19/2007	7:22	2.449 K		Snake	Leioheterodon modestus	1
3/19/2007	7:41	3.167 K		Dog	Canis familiaris	1
3/19/2007	8:06	4.885 K		Frog	Mantidactylus elegans	1
3/19/2007	8:11	5.526 K		Frog	Boophis madagascariensis	1
3/19/2007	8:29	7.029 K		Chameleon	Furcifer lateralis	1
3/19/2007	8:34	7.276 K		Snake	Leioheterodon modestus	1
3/19/2007	8:37	7.437 K		Frog	Undetermined	1
3/19/2007	8:43	7.448 K		Frog	Mantidactylus sp	1
3/19/2007	8:59	7.678 K		Frog	Mantidactylus sp	1
3/19/2007	9:01	7.735 K		Frog	Boophis sp	1
3/19/2007	9:05	7.805 k		Frog	Mantidactylus sp	1
3/19/2007	9:06	8.106 K		Frog	Mantidactylus sp	1
3/19/2007	9:08	8.115 K		Frog	Mantidactylus sp	1
3/19/2007	9:10	8.119 K		Frog	Mantidactylus sp	1
3/19/2007	9:12	8.122 K		Frog	Mantidactylus sp	1
3/19/2007	9:15	8.132 K		Frog	Mantidactylus sp	1
3/19/2007	9:16	8.145 k		Frog	Mantidactylus sp	1
3/19/2007	9:19	8.409 K		Frog	Mantidactylus sp	1
3/19/2007	9:20	8.432 K		Frog	Mantidactylus sp	1

3/19/2007	9:35	8.557 K	Frog	Mantidactylus sp	1
3/19/2007	9:38	8.645 K	Frog	Mantidactylus sp	1
3/19/2007	9:40	8.740 K	Frog	Mantidactylus sp	1
3/19/2007	9:43	9.020 K	Frog	Mantidactylus sp	1
3/19/2007	9:47	9.105 K	Snake	Undetermined	1
3/19/2007	9:50	9.172 K	Snake	Undetermined	1
3/19/2007	9:55	9.562 k	Snake	Leiopholidophis lateralis	1
3/19/2007	9:58	9.622 K	Frog	Mantidactylus sp	1
3/19/2007	10:15	10.421 K	Frog	Mantidactylus sp	1
3/19/2007	10:21	10.671 K	Tenrec	Greater hedgehog Tenrec	1
3/19/2007	10:22	10.674 K	Frog	Mantidactylus sp	1
3/19/2007	10:23	10.677 K	Frog	Mantidactylus sp	1
3/19/2007	10:30	10.766 K	Frog	Boopis sp	1
3/19/2007	10:35	10.902 K	Frog	Mantidactylus sp	1
3/19/2007	10:37	11.005 K	Frog	Mantidactylus sp	1
3/19/2007	10:39	11.331 K	Frog	Mantidactylus sp	1
3/19/2007	10:41	11.345 K	Frog	Mantidactylus sp	1
3/19/2007	10:43	11.504 K	Frog	Mantidactylus sp	1
3/19/2007	10:47	11.645 K	Frog	Mantidactylus sp	1
3/19/2007	10:52	12.038 K	Frog	Mantidactylus sp	1
3/19/2007	10:54	12.141 K	Frog	Mantidactylus sp	1
3/19/2007	10:55	12.156 K	Frog	Mantidactylus sp	1
3/19/2007	10:56	12.160 K	Frog	Mantidactylus sp	1
3/19/2007	11:07	12.245 K	Frog	Mantidactylus sp	1
3/19/2007	11:11	12.357 K	Frog	Mantidactylus sp	1
3/19/2007	11:12	12.367 K	Chameleon	Undetermined	1
3/19/2007	11:13	12.402 K	Frog	Boophis sp	1
3/19/2007	11:15	12.438 K	Frog	Mantidactylus sp	1
3/19/2007	11:15	12.444 K	Lezard	Oplurus cuvieri	1
3/19/2007	11:18	12.494 K	Tenrec	Greater hedgehog Tenrec	1
3/19/2007	11:21	12.501 K	Lezard	Undetermined	1
3/19/2007	11:22	12.552 K	Frog	Mantidactylus sp	1
3/19/2007	11:45	13.860 K	Snake	Sanzinia madagascariensis	1
3/19/2007	11:48	14.068 K	Bird	Alcedo vintsoides	1
3/19/2007	11:55	14.158 K	Frog	Mantidactylus sp	1
3/19/2007	11:57	14.624 K	Frog	Boophis sp	1
3/19/2007	12:01	14.717 K	Frog	Mantidactylus sp	2
3/19/2007	12:04	15.362 K	Frog	Mantidactylus sp	1
3/19/2007	12:15	15.852 K	Frog	Mantidactylus sp	1
3/19/2007	12:24	16:352 k	Frog	Mantidactylus sp	1
3/19/2007	12:26	16.452 K	Chameleon	Undetermined	1
3/19/2007	12:27	16.502 K	Frog	Mantidactylus sp	1
3/19/2007	12:30	16.552 K	Frog	Mantidactylus sp	1
3/19/2007	12:30	16.562 K	Lezard	Oplurus cuvieri	1
3/20/2007	7:02	0.374 K	Lezard	Undetermined	1
3/20/2007	7:06	0.388 K	Frog	Undetermined	1
3/20/2007	7:07	0.428 K	Snake	Leioheterodon	1

				modestus	
3/20/2007	7:09	0.448 K	Frog	Boophis sp	1
3/20/2007	7:15	0.727 K	Frog	Mantidactylus sp	1
3/20/2007	7:17	0.803 K	Frog	Mantidactylus sp	1
3/20/2007	7:24	1.450 K	Frog	Undetermined	1
3/20/2007	7:28	1.541 K	Frog	Mantidactylus sp	1
3/20/2007	7:34	1.845 K	Frog	Mantidactylus sp	1
3/20/2007	7:37	2.019 K	Frog	Mantidactylus sp	1
3/20/2007	7:43	2.378 K	Frog	Mantidactylus sp	1
3/20/2007	7:48	2.714 K	Frog	Mantidactylus sp	1
3/20/2007	7:50	2.764 K	Frog	Mantidactylus sp	1
3/20/2007	7:52	2.828 K	Frog	Mantidactylus sp	1
3/20/2007	7:55	2.950 K	Frog	Undetermined	1
3/20/2007	8:12	4.184 K	Frog	Mantidactylus sp	1
3/20/2007	8:15	4.288 K	Frog	Undetermined	1
3/20/2007	8:18	4.401 K	Frog	Mantidactylus sp	1
3/20/2007	8:19	4.431 K	Frog	Undetermined	1
3/20/2007	8:20	4.451 K	Frog	Undetermined	1
3/20/2007	8:21	4.470 K	Frog	Undetermined	1
3/20/2007	8:36	5.654 K	Snake	Acrantophis dumerili	1
3/20/2007	8:39	5.857 K	Frog	Undetermined	1
3/20/2007	8:42	5.964 K	Snake	Acrantophis dumerili	1
3/20/2007	8:44	6.065 K	Snake	Acrantophis dumerili	1
3/20/2007	8:46	6.159 K	Frog	Undetermined	1
3/20/2007	8:58	6.818 K	Frog	Undetermined	1
3/20/2007	9:02	6.998 K	Frog	Mantella sp	1
3/20/2007	9:12	7.624 K	Frog	Undetermined	1
3/20/2007	9:15	7.725 K	Frog	Undetermined	1
3/20/2007	9:33	8.059 K	Frog	Mantidactylus sp	1
3/20/2007	9:35	8.271 K	Chameleon	Dronicodryas quadrilineatus	1
3/20/2007	9:36	8.311 K	Frog	Undetermined	1
3/20/2007	9:38	8.487 K	Frog	Undetermined	1
3/20/2007	9:39	8.512 K	Frog	Undetermined	1
3/20/2007	9:40	8.595 K	Frog	Undetermined	1
3/20/2007	9:44	8.811 K	Mammals	Rattus rattus	1
3/20/2007	10:09	10.812 K	Lezard	Oplurus cyclurus	1
3/20/2007	10:12	10.827 K	Lezard	Oplurus cyclurus	1
3/20/2007	10:15	10.907 K	Frog	Mantidactylus sp	1
3/20/2007	10:18	10.932 K	Frog	Boophis sp	1
3/20/2007	10:22	11.110 K	Frog	Undetermined	1
3/20/2007	10:24	11.160 K	Frog	Undetermined	1
3/20/2007	10:27	11.497 K	Frog	Undetermined	1
3/20/2007	10:31	11.713 K	Frog	Undetermined	1
3/20/2007	10:35	11.926 K	Frog	Undetermined	1
3/20/2007	11:18	14.432 K	Frog	Undetermined	1
3/20/2007	11:21	14.645 K	Frog	Undetermined	1
3/20/2007	11:27	15.073 K	Chameleon	Furcifer minor	1

3/20/2007	11:30	15.350 K	Frog	Undetermined	1
3/20/2007	11:33	15.390 K	Frog	Undetermined	1
3/20/2007	11:40	16.090 K	Frog	Boophis sp	1
3/20/2007	11:44	16.191 K	Frog	Undetermined	1
3/20/2007	11:49	16.549 K	Frog	Undetermined	1
3/20/2007	11:57	17.081 K	Snake	Leioheterodon madagascariensis	1
3/21/2007	6:49	0.188 K	Frog	Boophis sp	1
3/21/2007	6:52	0.261 K	Frog	Boophis sp	1
3/21/2007	6:55	0.337 K	Frog	Boophis sp	1
3/21/2007	6:56	0.330 K	Frog	Boophis sp	1
3/21/2007	6:56	0.421 K	Frog	Mantidactylus sp	1
3/21/2007	6:57	0.431 K	Frog	Undetermined	1
3/21/2007	6:58	0.436 K	Frog	Boophis sp	1
3/21/2007	6:59	0.466 K	Frog	Mantidactylus sp	1
3/21/2007	7:00	0.476 K	Frog	Undetermined	1
3/21/2007	7:06	0.500 K	Frog	Mantidactylus sp	1
3/21/2007	7:09	0.548 K	Frog	Undetermined	1
3/21/2007	7:10	0.588 K	Frog	Undetermined	1
3/21/2007	7:11	0.589 K	Frog	Undetermined	1
3/21/2007	7:12	0.620 K	Frog	Undetermined	1
3/21/2007	7:15	0.663 K	Frog	Mantidactylus sp	1
3/21/2007	7:16	0.694 K	Frog	Boophis sp	1
3/21/2007	7:18	1.022 K	Frog	Undetermined	2
3/21/2007	7:21	1.951 K	Frog	Undetermined	1
3/21/2007	7:21	1.956 K	Frog	Mantidactylus sp	1
3/21/2007	7:22	1.962 K	Frog	Mantidactylus sp	1
3/21/2007	7:26	2.267 K	Snake	Madagascarophis colubrinis	1
3/21/2007	7:30	2.505 K	Frog	Undetermined	2
3/21/2007	7:33	2.656 K	Frog	Undetermined	1
3/21/2007	7:35	2.773 K	Frog	Undetermined	1
3/21/2007	7:36	2.823 K	Frog	Undetermined	2
3/21/2007	7:38	2.887 K	Frog	Undetermined	1
3/21/2007	7:38	2.926 K	Frog	Undetermined	1
3/21/2007	7:46	3.388 K	Frog	Undetermined	1
3/21/2007	7:50	3.701 K	Snake	Leioheterodon modestus	1
3/21/2007	7:58	4.228 K	Frog	Undetermined	1
3/21/2007	7:59	4.232 K	Frog	Undetermined	1
3/21/2007	8:00	4.262 K	Frog	Undetermined	1
3/21/2007	8:01	4.389 K	Frog	Undetermined	1
3/21/2007	8:01	4.394 K	Frog	Boophis sp	1
3/21/2007	8:03	4.456 K	Frog	Undetermined	2
3/21/2007	8:09	5 K	Frog	Undetermined	2
3/21/2007	8:10	5.060 K	Frog	Undetermined	1
3/21/2007	8:11	5.144 K	Frog	Undetermined	1
3/21/2007	8:13	5.223 K	Frog	Boophis sp	2
3/21/2007	8:14	5.277 K	Frog	Undetermined	1
3/21/2007	8:15	5.338 K	Frog	Boophis sp	2
3/21/2007	8:18	5.448 K	Frog	Mantidactylus sp	1

3/21/2007	8:20	5.553 K	Frog	Undetermined	1
3/21/2007	8:21	5.583 K	Frog	Undetermined	1
3/21/2007	8:22	5.663 K	Frog	Undetermined	1
3/21/2007	8:24	5.723 K	Frog	Undetermined	1
3/21/2007	8:26	5.803 K	Bird	Madagascar red fody	1
3/21/2007	8:29	5.903 K	Frog	Undetermined	3
3/21/2007	8:31	6.053 K	Frog	Undetermined	2
3/21/2007	8:35	6.133 K	Frog	Undetermined	3
3/21/2007	8:37	6.203 K	Frog	Undetermined	2
3/21/2007	8:40	6.303 K	Frog	Undetermined	1
3/21/2007	8:41	6.318 K	Frog	Undetermined	1
3/21/2007	8:43	6.438 K	Frog	Undetermined	1
3/21/2007	8:46	6.508 K	Frog	Boophis sp	1
3/21/2007	8:50	6.548 K	Frog	Undetermined	1
3/21/2007	8:52	6.588 K	Frog	Undetermined	1
3/21/2007	8:53	6.638 K	Frog	Undetermined	1
3/21/2007	8:58	6.708 K	Snake	Liophidium rhodogaster	1
3/21/2007	9:00	6.858 K	Frog	Undetermined	2
3/21/2007	9:01	6.888 K	Frog	Undetermined	1
3/21/2007	9:02	6.908 K	Snake	Madagascarophis colubrinis	1
3/21/2007	9:04	6.983 K	Lezard	Furcifer pardalis	1
3/21/2007	9:06	7.043 K	Frog	Undetermined	1
3/21/2007	9:07	7.073 K	Frog	Undetermined	1
3/21/2007	9:09	7.163 K	Frog	Undetermined	2
3/21/2007	9:15	7.213 K	Snake	Dromicodrias sp	1
3/21/2007	9:17	7.293 K	Frog	Undetermined	3
3/21/2007	9:19	7.343 K	Frog	Undetermined	1
3/21/2007	9:21	7.423 K	Frog	Undetermined	2
3/21/2007	9:27	7.663 K	Frog	Undetermined	1
3/21/2007	9:30	7.723 K	Frog	Undetermined	2
3/21/2007	9:30	7.743 K	Frog	Undetermined	1
3/21/2007	9:32	7.813 K	Frog	Undetermined	1
3/21/2007	9:33	7.853 K	Frog	Undetermined	1
3/21/2007	9:35	7.903 K	Frog	Boophis sp	1
3/21/2007	9:51	9.100 K	Frog	Boophis sp	2
3/21/2007	9:56	9:200 K	Frog	Undetermined	2
3/21/2007	10:03	9:800 K	Frog	Undetermined	1
3/21/2007	10:04	9.850 K	Bats	Undetermined	1
3/21/2007	10:09	10.150 K	Chameleon	Undetermined	1
3/21/2007	10:14	10.450 K	Chameleon	Undetermined	1
3/21/2007	10:20	11.050 K	Frog	Undetermined	1
3/21/2007	10:21	11.250 K	Mammals	Rattus rattus	1
3/21/2007	10:29	11.730 K	Frog	Undetermined	1
3/21/2007	10:35	12.350 K	Frog	Boophis sp	1
3/21/2007	10:37	12.440 K	Frog	Undetermined	1
3/21/2007	10:00	13 K	Frog	Undetermined	1
3/21/2007	10:53	13.090 K	Frog	Undetermined	1
3/21/2007	10:54	13.104 K	Frog	Undetermined	1

3/21/2007	10:55	13.164 K	Frog	Undetermined	1
3/21/2007	10:57	13.264 K	Frog	Undetermined	1
3/21/2007	11:00	13.344 K	Frog	Undetermined	2
3/21/2007	11:06	14.044 K	Mammals	Rattus rattus	1
3/21/2007	11:08	14.144 K	Snake	Undetermined	1
3/21/2007	11:09	14.234 K	Frog	Undetermined	2
3/21/2007	11:12	14.434 K	Frog	Ptychadena mascarensis	1
3/21/2007	11:31	17.074 K	Frog	Undetermined	1
3/22/2007	6:40	0.379 K	Frog	Undetermined	1
3/22/2007	6:45	1.045 K	Frog	Boophis madagascariensis	1
3/22/2007	7:10	3.342 K	Frog	Undetermined	1
3/22/2007	7:15	3.640 K	Snake	Liophidium torquatus	1
3/22/2007	7:21	3.745 K	Frog	Undetermined	1
3/22/2007	7:24	4.114 K	Snake	Madagascarophis citrinus	1
3/22/2007	7:25	4.125 K	Frog	Undetermined	1
3/22/2007	7:26	4.135 K	Frog	Undetermined	1
3/22/2007	7:26	4.145 K	Frog	Mantidactylus sp	1
3/22/2007	7:27	4.165 K	Frog	Undetermined	1
3/22/2007	7:28	4.175 K	Frog	Undetermined	1
3/22/2007	7:28	4.185 K	Frog	Undetermined	1
3/22/2007	7:29	4.195 K	Frog	Mantidactylus sp	1
3/22/2007	7:29	4.195 K	Frog	Undetermined	1
3/22/2007	7:29	4.200 K	Frog	Undetermined	1
3/22/2007	7:31	4.605 K	Frog	Undetermined	1
3/22/2007	7:32	4.625 K	Frog	Mantella sp	1
3/22/2007	7:32	4.635 K	Frog	Undetermined	1
3/22/2007	7:37	4.829 K	Chameleon	Furcifer pardalis	1
3/22/2007	7:40	4.947 K	Frog	Undetermined	1
3/22/2007	7:40	4.954 K	Frog	Undetermined	4
3/22/2007	7:41	5.146 K	Frog	Undetermined	1
3/22/2007	7:42	5.186 K	Frog	Mantella sp	1
3/22/2007	7:44	5.236 K	Frog	Undetermined	2
3/22/2007	7:45	5.256 K	Frog	Mantidactylus sp	1
3/22/2007	7:46	5.296 K	Frog	Undetermined	1
3/22/2007	7:47	5.306 K	Frog	Undetermined	1
3/22/2007	7:49	5.477 K	Frog	Undetermined	1
3/22/2007	7:51	5.537 K	Snake	Liopholidophis lateralis	1
3/22/2007	7:52	5.547 K	Frog	Undetermined	1
3/22/2007	7:57	5.897 K	Frog	Undetermined	1
3/22/2007	8:06	6.817 K	Frog	Undetermined	1
3/22/2007	8:08	6.919 K	Frog	Undetermined	1
3/22/2007	8:09	7.005 K	Frog	Undetermined	1
3/22/2007	8:10	7.015 K	Frog	Undetermined	1
3/22/2007	8:12	7.188 K	Frog	Undetermined	2
3/22/2007	8:12	7.198 K	Frog	Mantella sp	2
3/22/2007	8:12	7.198 K	Frog	Mantidactylus sp	1

3/22/2007	8:16	7.601 K	Frog	Undetermined	1
3/22/2007	8:19	7.704 K	Frog	Undetermined	1
3/22/2007	8:20	7.712 K	Frog	Undetermined	1
3/22/2007	8:22	7.767 K	Frog	Undetermined	3
3/22/2007	8:23	7.888 K	Frog	Undetermined	1
3/22/2007	8:24	7.898 K	Frog	Undetermined	1
3/22/2007	8:25	7.965 K	Frog	Undetermined	1
3/22/2007	8:30	8.190 K	Frog	Undetermined	1
3/22/2007	8:31	8.487 K	Frog	Undetermined	1
3/22/2007	8:36	8.594 K	Mammals	Rattus sp	1
3/22/2007	8:40	9.287 K	Snake	Liophidium torquatus	1
3/22/2007	8:46	9.471 K	Frog	Undetermined	1
3/22/2007	8:54	10.152 K	Frog	Undetermined	1
3/22/2007	8:58	10.483 K	Frog	Undetermined	1
3/22/2007	9:00	10.599 K	Frog	Undetermined	1
3/22/2007	9:04	11.057 K	Frog	Undetermined	1
3/22/2007	9:10	11.185 K	Frog	Undetermined	2
3/22/2007	9:10	11.285 K	Lezard	Oplurus sp	1
3/22/2007	9:14	11.622 K	Frog	Undetermined	1
3/22/2007	9:17	11.838 K	Frog	Undetermined	1
3/22/2007	9:19	11.943 K	Frog	Undetermined	1
3/22/2007	9:21	12.051 K	Chameleon	Undetermined	1
3/22/2007	9:24	12.259 K	Frog	Undetermined	1
3/22/2007	9:26	12.362 K	Frog	Undetermined	1
3/22/2007	9:28	12.665 K	Frog	Undetermined	1
3/22/2007	9:29	12.745 k	Frog	Undetermined	1
3/22/2007	9:30	13.005 K	Frog	Undetermined	1
3/22/2007	9:34	13.220 K	Frog	Undetermined	1
3/22/2007	9:42	13.390 K	Frog	Undetermined	1
3/22/2007	9:54	14.477 K	Frog	Mantella sp	1
3/22/2007	9:54	14.477 K	Frog	Undetermined	1
3/22/2007	9:56	14.681 K	Bird	Alcedo vintsoides	1
3/22/2007	9:58	14.878 K	Frog	Undetermined	1
3/22/2007	10:00	14.963 K	Frog	Undetermined	1
3/22/2007	10:02	15.055 K	Chameleon	Furcifer pardalis	1
3/22/2007	10:03	15.104 K	Frog	Boophis madagascariensis	1
3/22/2007	10:06	15.108 K	Frog	Undetermined	1
3/22/2007	10:07	15.112 K	Frog	Mantidactylus sp	1
3/22/2007	10:10	15.159 K	Snake	Liopholidophis lateralis	1
3/22/2007	10:13	15.160 K	Chameleon	Furcifer pardalis	1
3/22/2007	10:23	15.272 K	Tenrec	Greater hedghog tenrec	1
3/22/2007	10:26	16.702 K	Chameleon	Furcifer sp	1
3/22/2007	10:31	17.135 K	Frog	Undetermined	1
3/22/2007	10:33	17.178 K	Frog	Undetermined	1
3/22/2007	10:36	17.428 K	Frog	Undetermined	1
3/22/2007	10:39	17.539 K	Frog	Undetermined	1
3/22/2007	10:39	17.641 K	Frog	Undetermined	1

3/23/2007	6:59	0.376 k	Chameleon	Camaleo lateralis	1
3/23/2007	7:25	2.080 K	Frog	Hetereixalus boettgeri	1
3/23/2007	7:29	3.320 K	Frog	Undetermined	1
3/23/2007	7:33	3.434 K	Chameleon	Undetermined	1
3/23/2007	7:37	3.749 K	Lezard	Mabuya elegans	1
3/23/2007	7:47	4.723 K	Frog	Undetermined	2
3/23/2007	7:50	4.745 K	Snake	Dromicodryas quadrileatus	1
3/23/2007	7:54	5.054 K	Frog	Undetermined	1
3/23/2007	7:58	5.364 K	Snake	Dromicodryas quadrileatus	1
3/23/2007	8:01	5.586 K	Frog	Undetermined	2
3/23/2007	8:03	5.692 K	Frog	Undetermined	1
3/23/2007	8:04	5.752 K	Frog	Undetermined	1
3/23/2007	8:05	5.793 K	Frog	Undetermined	1
3/23/2007	8:07	5.898 K	Frog	Undetermined	1
3/23/2007	8:10	6.191 K	Tenrec	Greater hedghod tenrec	1
3/23/2007	8:14	6.475 K	Chameleon	Furcifer sp	1
3/23/2007	8:14	6.525 K	Frog	Undetermined	1
3/23/2007	8:15	6.564 K	Frog	Undetermined	1
3/23/2007	8:19	6.841 K	Frog	Undetermined	1
3/23/2007	8:21	7.393 K	Frog	Undetermined	1
3/23/2007	8:30	7.738 K	Frog	Undetermined	2
3/23/2007	8:31	7.778 K	Frog	Undetermined	1
3/23/2007	8:31	7.841 K	Frog	Undetermined	1
3/23/2007	8:33	7.861 K	Frog	Undetermined	1
3/23/2007	8:34	7.942 K	Frog	Undetermined	1
3/23/2007	8:36	8.046 K	Frog	Mantidactylus sp	1
3/23/2007	8:38	8.125 K	Frog	Undetermined	2
3/23/2007	8:41	8.352 K	Frog	Undetermined	1
3/23/2007	8:42	8.427 K	Frog	Ptychadena mascariensis	1
3/23/2007	8:44	8.461 K	Frog	Boophis sp	1
3/23/2007	8:44	8.840 K	Frog	Undetermined	1
3/23/2007	8:53	9.087 K	Frog	Undetermined	1
3/23/2007	8:56	9.278 K	Frog	Undetermined	1
3/23/2007	8:58	9.370 K	Frog	Undetermined	1
3/23/2007	8:59	9.380 K	Frog	Undetermined	1
3/23/2007	9:01	9.552 K	Frog	Undetermined	1
3/23/2007	9:02	9.564 K	Frog	Undetermined	1
3/23/2007	9:09	10.113 K	Frog	Undetermined	1
3/23/2007	9:09	10.113 K	Frog	Mantella pulchra	2
3/23/2007	9:15	10.652 K	Chameleon	Camaleo lateralis	1
3/23/2007	9:15	10.652 K	Frog	Undetermined	1
3/23/2007	9:19	10.870 K	Lezard	Mabuya elegans	1
3/23/2007	9:22	10.991 K	Frog	Undetermined	1
3/23/2007	9:31	11.334 K	Frog	Undetermined	1
3/23/2007	9:42	12.364 K	Frog	Undetermined	1
3/23/2007	9:44	12.466 K	Mammals	Rattus rattus	1

3/23/2007	9:47	12.667 K		Frog	Undetermined	1
3/23/2007	9:52	12.862 K		Snake	Madagascarophis meridionalis	1
3/23/2007	9:57	13.340 K		Frog	Undetermined	1
3/23/2007	9:58	13.355 K		Snake	Madagascarophis meridionalis	1
3/23/2007	10:00	13.472 K		Frog	Boophis sp	1
3/23/2007	10:31	14.440 K		Frog	Undetermined	1
3/23/2007	10:32	14.458 K		Frog	Undetermined	1
3/23/2007	10:33	14.508 K		Chameleon	Furcifer sp	1
3/23/2007	10:35	14.582 K		Frog	Undetermined	1
3/23/2007	10:40	14.905 K		Frog	Undetermined	1
3/23/2007	10:41	15. 030 K		Frog	Undetermined	1
3/23/2007	10:43	15.085 K		Frog	Undetermined	1
3/23/2007	10:51	15.793 K		Frog	Undetermined	2
3/23/2007	10:54	16.073 K		Frog	Undetermined	1
3/23/2007	11:01	16.752 K		Frog	Undetermined	1
3/23/2007	11:03	16.883 K		Frog	Undetermined	1
3/23/2007	11:10	17.208 K		Frog	Undetermined	1
7/20/2007	9:10		457	Snake	Ithycyphus miniatus	1
7/20/2007	8:40		460	Frog	Undetermined	1
7/20/2007	8:20		463	Snake	Dromicodryas sp	1
7/20/2007	8:10		464	Snake	Leioheterodon madagascariensis	1
7/20/2007	7:50		466	Snake	Liopholidophis sp	1
7/21/2007	10:00		450	Snake	Liopholidophis sp	1
7/21/2007	10:25		452	Frog	Undetermined	2
7/21/2007	10:10		453	Chameleon	Furcifer sp	1
7/21/2007	9:35		455	Bats	Undetermined	1
7/21/2007	9:20		458	Rats	Undetermined	1
7/21/2007	9:10		459	Snake	Madagascarophis colubrina	1
7/21/2007	8:55		461	Frog	Undetermined	1
7/21/2007	8:45		462	Rats	Undetermined	1
7/21/2007	8:30		463	Snake	Dromicodryas sp	1
7/21/2007	8:20		464	Snake	Madagascarophis colubrina	1
7/21/2007	8:05		465	Rats	Undetermined	1
7/21/2007	7:37		466	Snake	Liopholidophis sp	1
7/21/2007	7:35		467	Snake	Liopholidophis sp	1
7/21/2007	7:27		468	Snake	Ithycyphus miniatus	1
7/21/2007				Snake	Memophis	1
7/21/2007				Snake	Dromicodryas sp	1
7/22/2007	10:08		453	Snake	Madagascarophis sp	1
7/22/2007	9:50		456	Frog	Undetermined	1
7/22/2007	9:35		457	Frog	Undetermined	1
7/22/2007	9:25		458	Snake	Liopholidophis sp	1
7/22/2007	8:40		462	Bird	Madagascar fody	1
7/22/2007	7:40		467	Snake	Stenophis sp	1
7/22/2007	8:00		467	Rat	Undetermined	1
7/23/2007	10:05		456	Frog	Undetermined	1

7/24/2007	11:05	453	Frog	Undetermined	3
7/24/2007	10:05	457	Frog	Undetermined	1
7/24/2007	8:00	467	Snake	Memophis sp	1
7/25/2007	9:05	453	Snake	Stenophis sp	1
7/25/2007	8:54	454	Rat	Undetermined	1
7/25/2007	8:33	457	Rat	Undetermined	1
7/25/2007	8:29	458	Chameleon	Furcifer sp	1
7/25/2007	7:55	465	Snake	Memophis sp	1
7/25/2007		468	Frog	Undetermined	1
7/25/2007	7:29	468.5	Rat	Undetermined	2
7/25/2007			Snake	Liopholidophis sp	1
7/26/2007	9:28	457	Frog	Undetermined	1
7/26/2007	9:10	460	Snake	Memophis sp	1
7/26/2007	8:43	462	Snake	Madagascarophis sp	1
7/26/2007	8:31	462.5	Rat	Undetermined	1
7/26/2007	8:50	462.5	Chameleon	Furcifer sp	1
7/26/2007	8:22	463	Snake	Memophis sp	1
7/26/2007	7:47	468	Snake	Dromicodryas sp	1
7/26/2007	7:34	468.5	Snake	Itycyphus sp	1
7/26/2007			Frog	Undetermined	1
7/27/2007	10:00	453	Chameleon	Furcifer sp	1
7/27/2007	9:50	454	Snake	Dromycodryas sp	1
7/27/2007	9:35	455	Snake	Memophis sp	1
7/27/2007	9:25	456	Frog	Undetermined	2
7/27/2007			Lezard	Zonosaurus sp	1
7/28/2007	9:35	456	Snake	Madagascarophis sp	1
7/28/2007	7:55	466	Chameleon	Furcifer pardalis	1
7/28/2007	7:35	468	Snake	Memophis sp	1
7/29/2007	10:55	452	Frog	Boophis sp	1
7/29/2007	10:30	454	Frog	Boophis sp	2
7/29/2007	10:10	456	Snake	Dromicodryas	1
7/29/2007	9:10	460	Frog	Boophis sp	1
7/29/2007	8:45	461	Frog	Boophis sp	1
7/29/2007	8:55	461	Snake	Sanzinia madagascarariensis	1
7/29/2007	8:30	463	Snake	Memophis sp	1
7/29/2007	8:25	464	Frog	Boophis sp	1
7/29/2007	8:10	466	Frog	Boophis sp	1
7/29/2007	7:45	467	Snake	Stenophis sp	1
7/29/2007	8:00	467	Frog	Boophis sp	1
7/29/2007	7:35	468	Frog	Undetermined	2
7/29/2007	7:30	469	Snake	Madagascarophis sp	1