

Biosphere Expeditions

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Expedition report

Surveying monkeys, macaws and other animals of the Peru Amazon



Expedition dates: 20 May – 16 June 2002

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Abstract

This study was part of an expedition to the Las Piedras river of the Peru Amazon run by Biosphere Expeditions from 20 May to 16 June 2002. It investigated avian and mammalian geophagy, the effects of boat traffic on avian colpa behaviour, and compiled species lists in an effort to study biodiversity, elucidate behavioural patterns and reasons for geophagy behaviour, as well as human impact on the clay licks (colpas) and the area in general.

This first expedition to the Las Piedras river of its kind achieved some highly significant results. In just 18 days of data collection 31 species of medium to large mammal and 144 species of bird were recorded. Analyses of the data show that both diversity and relative abundance levels of mammals and birds are high, significantly higher than in the adjacent protected area of the Tambopata Reserve Zone. 9 species of monkey were recorded in just 18 days of data collection. This is a significantly higher number than in the Tambopata Reserve Zone (7 species).

It is clear that the area along the Las Piedras river is of high biodiversity, by and large devoid of human impact and worthy of further study.

Este estudio fue parte de una expedición en Río Las Piedras en la selva Peruana organizado por Biosphere Expeditions del 20 Mayo 2002 al 16 de Junio 2002. Se investigo geofagia de mamíferos y aves, los efectos de trafico de botes sobre el comportamiento de guacamayos en una collpa y preparó una lista de especies para estudiar la biodiversidad.

Este fue la primer expedición de este tipo en el Rio Las Piedras y se logro conseguir resultados muy buenos. En solo 18 días de colección de datos 31 especies de mamíferos de mediano a grande y 144 especies de aves fueron registrado. Analices de datos muestran que la diversidad y la abundancia de mamíferos y aves son altos, mas altos que en la zona Reservada Tambopata Candamo. 9 especies de monos fueron Registrado en solo 18 días. Este es mas que en la zona reservada Tambopata (7 especies).

Parece que el Río Las Piedras es una lugar de alta biodiversidad, que valdría la pena investigar mas.

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1. Expedition Review

Matthias Hammer
Biosphere Expeditions

1.1. Background

Biosphere Expeditions is an award-winning, non-profit-making organisation offering hands-on wildlife conservation expeditions as an adventure with a purpose for everyone. Projects are not tours, photographic safaris or excursions, but genuine wildlife expeditions placing ordinary people with no research experience alongside scientists who are at the forefront of conservation work. Expeditions are open to all, there are no special skills (biological or otherwise) required to join and there are no age limits whatsoever. Expedition team members are people from all walks of life, of all ages, looking for an adventure with a conscience and a sense of purpose.

Projects run worldwide, all year round, and anyone can join for anything from two weeks to several months. Expedition contributions vary depending on the expedition and at least two-thirds of the expedition contribution benefit the project directly and locally. Biosphere Expeditions always work with local people and scientists, teams are small and there is a dedicated expedition leader with the team at all times.

More information about Biosphere Expeditions and its research expeditions can be found at www.biosphere-expeditions.org.

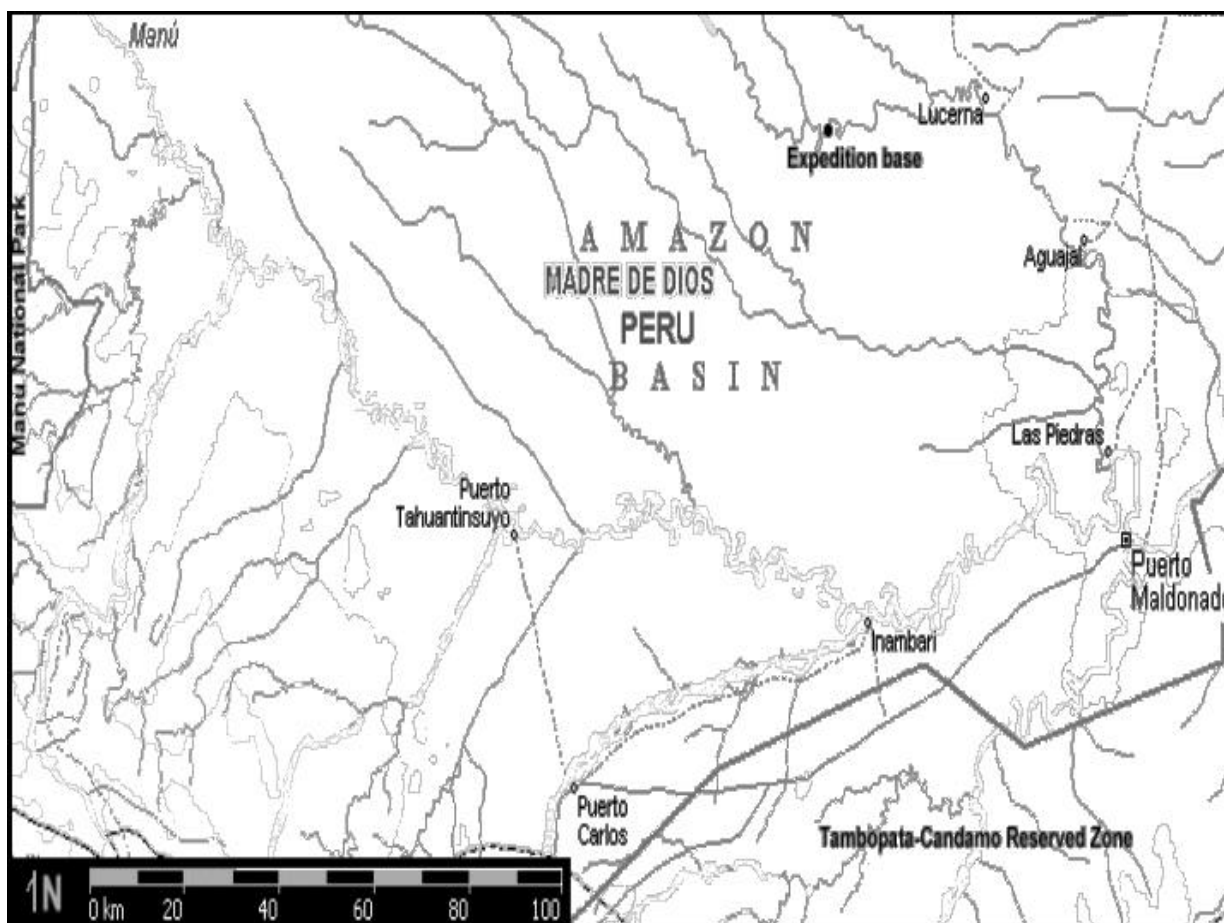
This expedition report deals with an expedition to the Las Piedras River in Peru from 20 May to 16 June 2002. Rapid Assessment Programs (RAPs) are snap-shot studies of an area, investigating the flora and fauna present in order to create species lists and determine relationships and impacts that may exist. The expedition's RAP included visual encounter surveys, mammal and bird censuses at so-called colpas (clay lick sites where animals congregate to eat soil) and behavioural studies.

Increasing economic development is putting a strain on the natural resources of the Peruvian Amazon. Unsustainable forms of farming and tourism are on the rise, especially along the Tambopata River, an area renowned for its biodiversity. The River Piedras represents an adjacent river system, connecting Tambopata and Manu, which has never been studied and has far less human presence than Tambopata. Unlike Tambopata and Manu, Piedras is not yet protected and for this reason vital research needs to be carried out and the results presented to conservation groups in an effort to conserve this unique tract of rain forest.

1.2. Research Area

Peru is located on the Pacific coast of South America and is the third largest country on the continent. Two thirds of Peruvian territory is located within the Amazon basin. The expedition base camp is within the department of Madre de Dios, internationally known as “the Biodiversity Capital of the World”. The department already contains two large national parks covering over half of its 78,000 km² area – Manu and the vast Bahuaja-Sonene (Tambopata) area. The Rio Piedras is located between the two.

In terms of biological diversity, the research area is amongst the richest in the world. Research conducted over the last 20 years in the Bahuaja-Sonene National Park has shown that it harbours more species of birds (587), butterflies (1,230) and many other animal taxa than any other location of comparable size. Most recently it has also been identified as the largest uninhabited and untouched rain forest wilderness on Earth, covering about 1 million hectares (2.5 million acres) of undisturbed and un hunted habitat (the nearest rival, the island of New Guinea has about 100,000 hectares of uninhabited tropical forest habitat). The area is also home to a number of landmark animals listed in the IUCN's Red Data Book. Amongst them the giant river otter, giant armadillo, giant anteater, ocelot, jaguarundi, jaguar, harpy eagle, crested eagle, spectacled caiman, and black caiman. Over 150 different species of tree can be found within 100 m² alone, and the WWF and IUCN have identified the area as a 'Centre of Plant Diversity'.



Map of the area showing Puerto Maldonado (assembly point), Manu (NW corner), Tambopata-Candamo (SE corner) and base camp location (N edge).
Base camp coordinates are S 12° 05.663', W 69° 52.852'.

1.3. Dates

The expedition ran over a period of four weeks divided into two two-week slots, each composed of a team of international research assistants, guides, support personnel and an expedition leader. Expedition team dates were

20 May – 2 June 2002

3 June – 16 June 2002

Dates were chosen to coincide with the dry season when data are most valuable, because the environment is usually relatively stable, except for *friajes* (see below).

1.4. Local Conditions & Support

The area lies within the confines of the Amazon basin in SE Peru with a sub-tropical climate and distinct wet and dry seasons, the wet season being between October and April when it rains nearly every day and the humidity is high, around 90% inside the forest. During the dry season temperatures can rise to 35 °C but the humidity tends to be lower. Between May and July cold weather events known as *friajes* can occur when cold fronts move in from the South and temperatures drop to between 8-15 °C for up to 8 days. The area's ecosystems hold several world records in flora and fauna species numbers and are recognised as one of the planet's hotspots of biodiversity. Rainfall averages 2,000 mm per year and humidity averages about 75%.

The expedition was based in a remote region along the Las Piedras river and gained access to the site in approximately seven boat hours from Puerto Maldonado. Once at base camp, all research sites apart from the macaw colpa were accessible by foot. The macaw colpa is ten minutes upstream from the base camp by boat.

Base camp was a lodge made from local materials. It had double rooms, showers and toilets. Team members paired up to share rooms. All meals were prepared for the team and vegetarians could be catered for. Electricity was provided by solar panels, but was used to power the radio and computer workstation only.

Field communications

The research site is outside mobile phone coverage. Where possible Motorola HT600 2-way radios were used for communication between research teams and around base. However, because of the dense jungle foliage in practice this meant that radio-to-radio coverage, even on 5 Watt, was limited to fewer than 1000 m inside the forest and 2 – 5 km along the rivers. The lodge had a long-distance radio for emergency communication with Puerto Maldonado and the expedition carried a Motorola satellite phone for emergency calls and for daily internet connection. This was found to work well, especially since a special cone antenna was used to pick up satellite signals. Costs of this type of internet connection, however, are high (\$1 per minute flat rate), and speeds slow (9600 bits per second).

Transport & vehicles

Team members made their own way to the Puerto Maldonado assembly point. From there transport to the base camp involved a boat ride of approximately seven hours. Once at base most studies were conducted on foot. All transport, boats & vehicles were provided from the expedition team assembly point onwards and back.

Medical & medical insurance

There were no serious medical incidences during the expedition. The expedition leader was fully trained in expedition and wilderness medicine, and the expedition carried a comprehensive medical kit. Further medical support was provided through a medical post in the Colpayo community, about 2 hours by boat, where there is an appointed expedition nurse. The nearest hospital is in Puerto Maldonado, about 6 hours by boat. All team members were required to carry adequate travel insurance covering emergency medical evacuation and repatriation.

1.5. Local Biologist

The expedition's local biologist was Emma Tatum-Hume. Born and raised in England, she first came to Peru in 1997. After spending a year working on conservation projects in Australia, she studied Natural Environmental Science at Sheffield University and shortly after went to Peru to work as a Resident Naturalist for Explorers Inn – one of the big lodges in Tambopata. She has also been an operations manager of another lodge and has worked as a naturalist guide in Tambopata and Manu. She set up the Piedras Biodiversity Station along with her partner Juan Julio, a local guide. She has travelled extensively including an expedition to the Tien Shan Mountains, Kyrgyzstan.

1.6. Expedition Leaders

The first slot of this expedition was led by Matthias Hammer, founder and Field Operations Director of Biosphere Expeditions. Born in Germany, he went to school there, before joining the Army at 18, and serving for several years amongst other units with the German Parachute Regiment. After active service he came to the UK and was educated at Christ Church, Oxford (studying for a BA in Biological Sciences), and King's College, Cambridge (studying for a PhD in Biological Anthropology). During his time at university he either organised or was involved in the running of several expeditions, some of which were conservation expeditions (for example to the Brazil Amazon, Madagascar, and the Indian Himalayas), whilst others were mountaineering/climbing expeditions (for example to the Russian Caucasus, the Alps, the Rocky Mountains, and the Seychelles). With Biosphere Expeditions he has led teams all over the globe. He is a ski instructor, mountain leader and survival skills instructor. He lives in an old gatekeeper's cottage in the Broads National Park.

The second slot of the expedition was led by Helen Boulden. Born and raised in Kent, and with a degree from the University of Leeds, Helen spent some years working in the photographic industry, fulfilling various roles for a prominent historical photo archive which included a spell based in New York. A keen ornithologist and natural historian, she has been involved with UK reintroduction schemes of the Common Dormouse and European Beaver, as well as bat population monitoring and surveying projects in Kent, and has experience of tracking mammals and bird ringing studies. With Biosphere Expeditions she has been on expeditions to the Ukraine and Poland. She is a qualified MLTB group leader and wilderness medical officer.

1.7. Expedition Team

The expedition team was recruited by Biosphere Expeditions and consisted of a mixture of all ages, nationalities and backgrounds

20 May – 2 June 2002

Linda and Stephen Abram (UK), Sarah Barrell (UK), Kathleen Harrison (UK), Bob Hussey (UK), Gail Travers (IRL), William Warbuton (UK), Michelle Ward (AUS), Freddy Widmer (CH). Guide: Juan J. Durand Torres. Boat driver: Antonio Silva. Cook: Lucio Olvea. Support staff: Pedro Velasquez and Maria Cordero.

3 June – 16 June 2002

Caroline Gazeley (UK), James Moss (UK), Lawrence Ninham (UK), Alice Paterson (UK), Sharon Risdell (UK), William Warburton (UK), Lisa Wilkes (UK). Guide: Juan J. Durand Torres. Boat driver: Antonio Silva. Cook: Lucio Olvea. Support staff: Pedro Velasquez and Maria Cordero.

1.8. Expedition Budget

Each team member paid towards expedition costs a contribution of approx. £1000 per person per two week slot (depending on when and for how long expedition team members joined). The contribution covered accommodation and meals, supervision and induction, all maps and special non-personal equipment, all transport from and to the team assembly point. It did not cover excess luggage charges, travel insurance, personal expenses like telephone bills, souvenirs etc., as well as visa and other travel expenses to and from the assembly point (e.g. international flights). Details on how this contribution was spent are given below.

Income	£	
Expedition contributions	15,770	
Expenditure		% of which spent directly on project
Local scientists (includes accommodation, food, transport, staff salaries, permits, logistics etc)	7,045	100
UK staff (includes staff transport to expedition, board, lodging, salaries etc.)	2,518	100
Equipment and hardware	793	81
Communication and other expedition logistics	405	100
Income – Expenditure (unadjusted)	5,009	
Income – Expenditure (adjusted to % spent on project)	5,160	
Total percentage spent directly on project	67%	

1.9. Previous Expeditions

This was Biosphere Expeditions' second expedition to the Peru Amazon. The abstract of the expedition report of the first expedition is given below. More details and the expedition report are available on www.biosphere-expeditions.org

Abstract of expedition report 2001: Parrot colpa and geophagy behaviour, and vertebrate species lists from the El Gato region of the Tambopata-Candamo Reserved Zone, Amazonia, Peru.

This study was part of an expedition to the Tambopata-Candamo Reserved Zone of the Peru Amazon run by Biosphere Expeditions from 27 May to 8 July 2001. It investigated parrot geophagy and compiled vertebrate species lists in an effort to elucidate behavioural patterns and reasons for geophagy behaviour, as well as human and tourist impact on the clay licks (colpas) and the area in general. A small colpa was discovered by the expedition and seven parrot and one pigeon species were observed feeding at it over a period of 23 observation days. The study found that the most likely reason for clay eating is detoxification. It also found that on the small colpa discovered, there was evidence of a correlation between parrot body size and feeding behaviour: the smaller species were more likely to feed more often, whereas the larger species tended to be wary and fed less often, or stayed off the colpa altogether. Whilst the smaller species appeared to be unaffected by human interference around the study site, the larger ones were thought to be dissuaded from feeding by the presence of the researchers, even though hides were constructed. Because of this the study concludes that, in contrast to large and open clay licks, small colpa sites as the one discovered are unlikely to be suitable for prolonged and sustainable touristic use.

1.10. Acknowledgements

This study was conducted by Biosphere Expeditions which runs wildlife conservation expeditions all over the globe. Without our expedition team members who provide an expedition contribution and give up their spare time to work as research assistants, none of this research would have been possible. The expedition team were Linda and Stephen Abram, Sarah Barrell, Caroline Gazeley, Kathleen Harrison, Bob Hussey, Lawrence Ninham, Alice Paterson, Sharon Risdell, Gail Travers, William Warbuton, Michelle Ward, Freddy Widmer, Lisa Wilkes, James Moss. A special thanks to Emma Tatum-Hume, our local biologist, and her partner Juan J. Durand Torres, our guide, who gave us and the world the wonderful Piedras Biodiversity Station to live and work in. Biosphere Expeditions would also like to thank WASAI lodge and its staff for providing logistical support, as well as Land Rover, Motorola, Silva, Field & Trek, Globetrotter Ausrüstung and Gerald Arnhold for their sponsorship.

1.11. Further Information & Enquiries

More background information on Biosphere Expeditions in general and on this expedition in particular including pictures, diary excerpts and a copy of this report can be found on the Biosphere Expeditions website www.biosphere-expeditions.org.

Enquires should be addressed to Biosphere Expeditions at the address given below.

2. Mammal Survey

Emma Tatum-Hume
Piedras Biodiversity Station

2.1. Summarising Introduction

Assessing the biodiversity of a region may be regarded as the first stage towards its protection. Since the basic units of biodiversity are species, species lists of flora and fauna form a basis for determining an area's conservation importance.

This study produced species lists of medium to large mammals and birds from information collected during a four week survey period of transects and a mammal colpa (a site where mammals congregate to eat soil). The study was carried out in unresearched rainforest in the Amazon basin of SE Peru.

The survey recorded 31 species of mammals from direct and indirect observations. Although absolute density data are not yet available, comparisons of relative abundance with an adjacent Reserve Zone appear to demonstrate that the area has similar or higher abundance and diversity of mammals, and is therefore of high conservation importance.

2.2. Location

The study was carried out as part of a research expedition conducted by Biosphere Expeditions. The expedition ran from 20 May to 16 June and studies were conducted between 24 May and 14 June. The expedition base was the Piedras Biodiversity Station on the banks of the river Las Piedras, approximately 60 km northwest (approximate bearing 325°) along the River Las Piedras (GPS position S 12° 05.663' W 69° 52.852'). This remote site can be reached by river taking approximately 7 hours in a boat with outboard motor.

The river Las Piedras lies between Tambopata and Manu, two areas in SE Peru renowned for high biodiversity and protected by the Peruvian government as a Reserve Zone and a National Park respectively. Lying adjacent to these areas, Piedras until recently has received little human impact and no research had previously been carried out in the area. The study site consists mainly of lowland tropical rainforest that receives an average annual rainfall of approx. 2,500 mm. The wet season is from October to April and the mean temperature 27°C. Mahogany wood was selectively extracted from the base camp area six years ago, but since then the only human presence has been the once yearly visits of 'Los Castañeros', a family that stayed in the area for up to one month to extract Brazil nuts.

2.3. Survey Methods

The expedition survey team consisted of several paying but untrained team members who gave up their holiday time to assist in the research project. Their work and expedition contribution made the research possible. Teams were at base camp for two weeks and then changed over with some people staying for more than one two week slot. Team sizes varied between seven and nine expedition members, plus one expedition leader, one field biologist, one guide and various support personnel (the latter not participating in the survey). Expedition team members were trained by the field scientist and guide in visual animal and bird recognition and made familiar with the calls and behaviour of the most common mammals believed to inhabit the area.

Species lists were compiled from surveys conducted along two transects. Both were measured and marked with plastic tape every 50 m to aid measurement of distance travelled along the transect. The first transect (length 2.8 km) began near base camp and ended at the mammal colpa. This transect, known as the colpa transect, was covered both morning and afternoon as research teams walked to the mammal colpa for their observation shifts. All mammal sightings were recorded on this transect to aid in the compilation of the species list.

The second transect, known as the density transect, began 1.5 km from base camp and measured 4.25 km. It took approximately six days to prepare, 3 km were cut by the first team and surveyed and the remaining 1.25 km by the second team. Due to the presence of 'aguajales' (boggy areas of permanent water), the transect was not cut on a pre-determined compass bearing as recommended by Perez (1999a), but was cut as straight as the terrain allowed without passing through the areas with stagnant water. Line transect surveys were carried out along this transect in order to estimate population densities of mammals and predetermined bird species.

Transect surveys have proven to be the most reliable method of producing density data. Previous studies (Perez 1999a, Emmons 1984) recorded primates, caviomorph rodents, sciurids, ungulates, cracids, trumpeters, tinamous, wood quails and a number of species of avian canopy frugivores. In this current study the only bird species included were those known to have been hunted or to use mammal colpas such as Spix's Guan (*Penelope jacquacu*), Common Piping Guan (*Aburria pipile*) and Razor-Billed Curassow (*Crax mitu*). The transect was walked between 06:15 – 10:30 to avoid the hottest part of the day when animals tend to be less active (Peres 1999a). If it rained whilst on the transect for more than ten minutes, the transect was abandoned as rain decreases the observer's ability to detect species.

The transect was walked at an average speed of 1.2 km/h and took between three and four hours to complete. For each detection event the observers recorded the time, distance along the transect, species, number of individuals, the perpendicular distance from the trail, group width, cue (how first detected), demography, visibility and weather conditions.

2.4. Statistical Analysis

The density transect took longer than expected to cut and so was only surveyed a total of eight times (29 km in total). As a result not enough data were collected to allow calculation of accurate mammal densities. The most frequently seen mammal on the density transect was the Saddle-backed Tamarin (*Saguinus fuscicollis*) which was encountered a total of five times over eight days. However, when absolute density (individuals/km²) was calculated using the statistical program Distance developed by Laake et al. (1999), there was a 35% variance in the results, indicating that the total sample size was too small and more data need to be collected.

The colpa transect was walked 36 times (100.8 km in total). Relative abundance, or the number of individuals per kilometre, was calculated by converting encounters with each species into sighting frequencies (see table 2.5a below). Relative abundance was then plotted against kilometres walked for the most commonly encountered species (see figures 2.5a-d below) in order to check the reliability of the data. Relative abundance figures have also been calculated for various species along the River Tambopata by Kirkby & Cornejo (1998), allowing for a comparison between the two areas (see table 2.5a below). A t-test was performed to test if there was a significant difference between the relative abundances of the Piedras site and each of the sites along the Tambopata River. The test assumes that data is normally distributed and included the eight mammal species known to inhabit both Piedras and Tambopata (see table 2.5a below). The test showed that there was a significant difference between the relative abundance of mammals at the Piedras site and the six sites in Tambopata (see table 2.5a below, $p=0.05$, $df=6$, tabulated value=2.477).

2.5. Results

A total of 22 mammal species were recorded on the two transects, 20 species from direct observations and two species from track identification, a further nine species were seen around camp and at the mammal colpa (see appendix 2.8a below).

As relative abundance (individuals per km) can be calculated from small samples, this index was used to investigate mammal populations encountered on the colpa transect, (see table 2.5a below). The most frequently encountered mammals were the Saddle-backed Tamarin (*Saguinus fuscicollis*) and the Black Spider Monkey (*Ateles paniscus*). Groups of *Saguinus fuscicollis* were encountered a total of 21 times on the transect and a total of 90 individuals were counted. Eleven groups of *Ateles paniscus* were encountered and a total of 38 individuals counted. In order to test whether the relative abundance figures calculated were reliable, graphs were plotted of relative abundance against kilometers walked. Figures 2.5a & b below show that the data for *Saguinus fuscicollis* and *Ateles paniscus* are more reliable than the data for Dusky Ti-Ti Monkey (*Callicebus brunneus*) and Brown Capuchin Monkey (*Cebus apella*) as the relative abundance curve stabilizes the greater the distance walked. The abundance curves for *Callicebus brunneus* and *Cebus apella* are still variable even after 100.8 km, suggesting that the relative abundance calculated from this data is not accurate and that more data need to be collected.

Table 2.5a. Number of individuals sighted per km walked for Piedras, and six sites along the River Tambopata

Species	Piedras	EI Gato	CA	EI	ECO	SACHA	TRC
<i>Aloutta seniculus</i> Red Howler Monkey	0.129	0.122	0.000	0.000	0.265	0.012	0.088
<i>Callicebus brunneus</i> Dusky Ti-Ti Monkey	0.159	0.180	0.000	0.070	0.000	0.000	0.286
<i>Cebus apella</i> Brown Capuchin	0.149	1.004	0.110	0.942	0.388	0.141	0.746
<i>Ateles paniscus</i> Black Spider Monkey	0.377	0.000	0.000	0.000	0.000	0.000	0.805
<i>Pithecia monachus</i> Monk Saki Monkey	0.079	-	-	-	-	-	-
<i>Saguinus fuscicollis</i> Saddle-backed Tamarin	0.893	0.366	0.959	0.464	0.681	0.356	0.483
<i>Sciurus pyrrhinus</i> Juinin Squirrel	0.099	-	-	-	-	-	-
<i>Dasybus novemcinctus</i> Brown Agouti	0.009	0.003	0.012	0.000	0.000	0.000	0.000
<i>Nasau nasau</i> South American Coati	0.159	0.136	0.000	0.012	0.135	0.221	0.000
<i>Tayassu pecari</i> Collared Peccary	2.073	0.042	0.000	0.000	0.077	0.207	0.000
<i>Penelope jacquacu</i> Spix Guan	0.139	-	-	-	-	-	-
T-test results		5.570	4.918	6.553	5.375	9.921	4.106

¹EI Gato, ²Cuzco Amazonico Lodge = CA, ²Explorer's Inn = EI, ²EcoAmazonia Lodge = ECO, ²Sachavacayoc Lodge = SACHA and ²Tambopata Research Centre = TRC. "-" indicates that data were unavailable. ¹Smith, 1999. ²Kirkby & Cornejo, 1998.

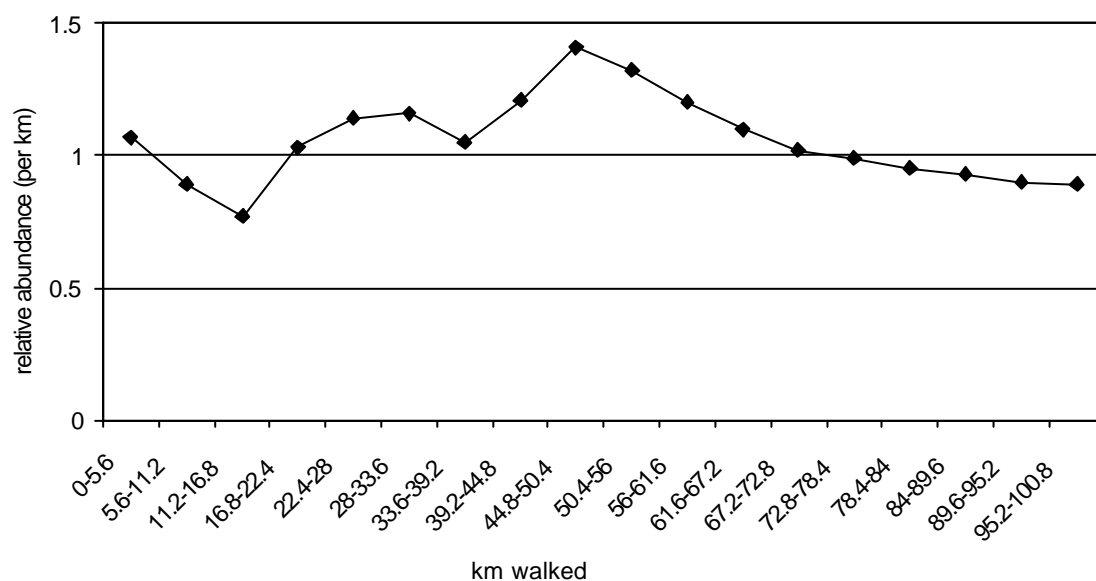


Figure 2.5a. Relative abundance of *Saguinus fuscicollis* on the colpa transect.

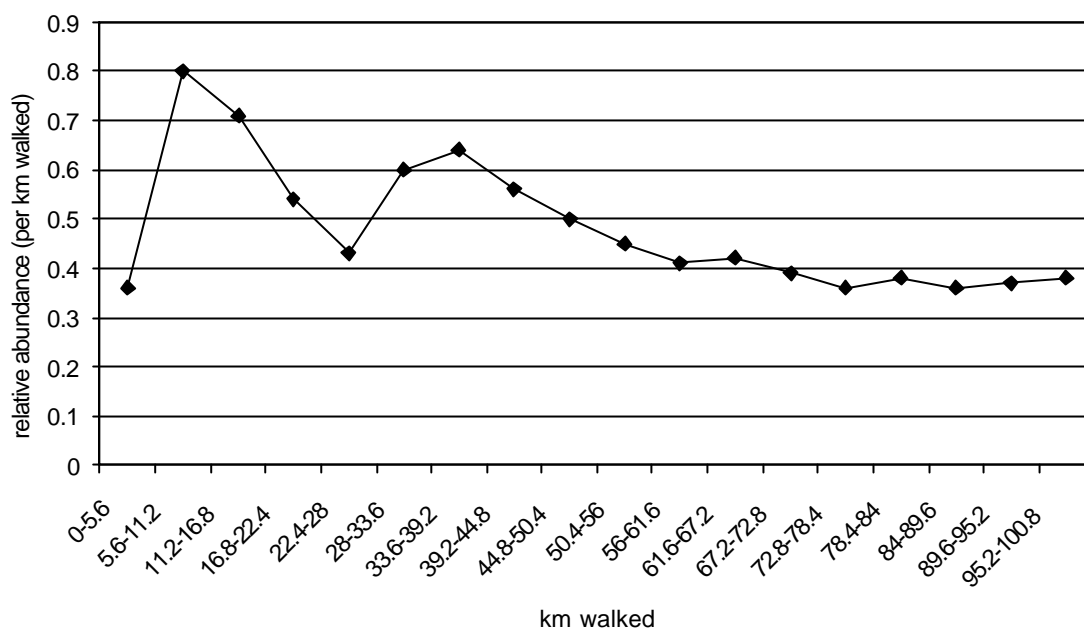


Figure 2.5b. Relative abundance of *Ateles paniscus* on the colpa transect.

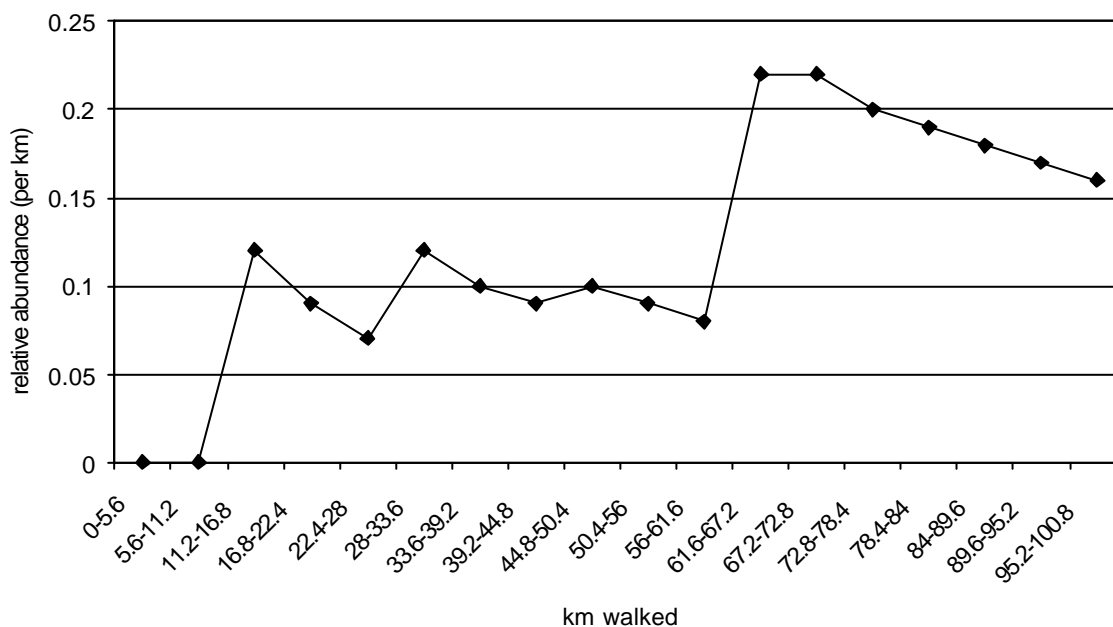


Figure 2.5c. Relative Abundance of *Callicebus brunneus* on the colpa transect.

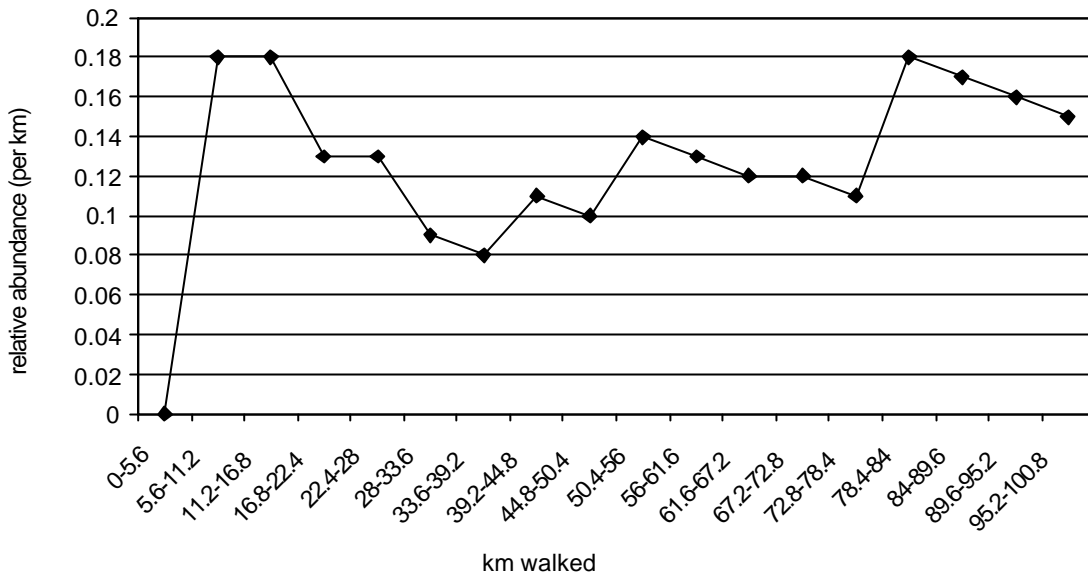


Table 2.5d. Relative abundance of *Cebus apella* on the colpa transect.

Only hunted birds were surveyed, since they tend to be larger in size and therefore easier to survey accurately and because they are the first species to disappear in a disturbed tract of forest. A total of five target species were encountered on transects. From sightings around camp, on the trails, on the river and at the macaw colpa a further 138 bird species were recorded (see appendix 2.8b below). Future work using mist nets and point count surveys are expected to lead to a more complete record of bird life in the area.

2.6. Discussion

The study revealed the presence of the Monk Saki Monkey (*Pithecia monachus*), a species of primate that is not found in the nearby Tambopata Reserve Zone or Bahuaja-Sonene National Park, but has been found in Manu National Park. A further species of primate Emperor Tamarin (*Saguinus imperator*) is believed to inhabit the area, but was not detected by the survey. Groups of Black Spider Monkeys (*Ateles paniscus*) were encountered on a regular basis (0.12 groups/km on the colpa transect). This species of primate is one of the first to disappear in areas that are hunted and is no longer seen inside the Tambopata Reserve Zone, except where it borders the Bahuaja-Sonene National Park. The presence of these two species in particular suggests that mammal diversity remains high at the Las Piedras site and that it has not been significantly depleted by hunting pressure.

Large bodied mammal species such as Peccary, Tapir, Howler Monkey and Spider Monkey are considered prime game species as they are more profitable in terms of quantity of meat harvested (Bodmer et al. 1997). The presence of all these species at the Piedras site is evidence that populations have not been significantly depleted by hunting.

On the first day that observations began, a herd of 103 White-lipped Peccaries were counted on the colpa transect. The actual size of the herd is likely to have been far larger and is thought to be at least double the number counted. Other White-lipped Peccary herds were seen a further five times during 18 days of data collection, or once every three days. Herds of White-lipped Peccaries of such sizes are rare due to their importance for meat in the diet of local people and because their food resources are patchy in distribution. In a study carried out by Perez (1999b) in Brazil, at the site with the highest densities of White-lipped Peccaries, local people reported seeing large herds between two to six times per year. At Cocha Cashu in Manu National Park, Kiltie and Terborough (1983) reported herd sightings every four and a half days on average with constant probability during the dry season. Why were they seen with greater frequency during this survey? Possibly the herd was slowly passing through the area and their presence coincided with the survey or perhaps the wide-ranging movements reported by Perez are not as obvious at this Piedras site, as food resources are more common and so herds do not have to forage over large areas. Only long term studies will be able to answer these questions. Perez concluded from his study that in order to preserve this vulnerable species, new nature reserves were needed in the least disturbed parts of the Amazon, especially southwest Amazonia where this study took place.

Large bird species such as Guans, Curassows and Trumpeters are usually the first bird species to disappear from an area which is hunted (Peres 1999b). Trumpeters in particular tend to inhabit areas well away from human disturbance. Spix's Guan, Common Piping Guan, Razor-billed Curassows and Pale-winged Trumpeters were all recorded at the Piedras site, suggesting that local bird populations have been little disturbed.

Relative abundance figures also suggest that the Piedras site is of high conservation interest as statistical analysis between the Piedras site and the Tambopata sites show mammal populations are significantly more abundant in Piedras. However, more data need to be collected before definite conclusions can be drawn, since the significant difference may be due to greater diversity and not greater abundance (i.e. the significant difference shown between Las Piedras and Tambopata may not be due to the greater abundance of mammals in Piedras, but instead due to greater diversity).

The aim of this study was to create the first species list of medium to large mammals at the study site in Las Piedras. Evidence suggests that this site has a high diversity of mammals and that levels of hunting in the past have had very little effect on populations. It is hoped that the results from this expedition will demonstrate to the Peruvian authorities that the River Piedras contains unique populations of mammals and birds that are worthy of further study and protection.

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2.8. Appendices

Appendix 2.8a. Mammal species seen on transects and at the mammal colpa and around the Research Station.

Mammals on colpa transect	Mammals on density transect	Mammals identified by tracks	Species encountered around camp & colpa
White-lipped Peccary <i>Tayassu pecari</i>	White-lipped Peccary <i>Tayassu pecari</i>	Tapir <i>Tapirus terrestris</i>	Giant Anteater <i>Myrmecophaga tridactyla</i>
Collared Peccary <i>Tayassu tajacu</i>	Collared Peccary <i>Tayassu tajacu</i>	Jaguar <i>Panthera onca</i>	Ocelot <i>Leopardus pardalis</i>
South American Coati <i>Nasua nasua</i>	Spider Monkey <i>Ateles paniscus</i>	Paca <i>Agouti paca</i>	Nine-banded Armadillo <i>Dasypus novemcintus</i>
Spider Monkey <i>Ateles paniscus</i>	Red Howler Monkey <i>Alouatta seniculus</i>		Brazilian Rabbit <i>Sylvilagus brasiliensis</i>
Red Howler Monkey <i>Alouatta seniculus</i>	Brown Capuchin <i>Cebus apella</i>		Capybara <i>Hydrochaeris hydrochaeris</i>
Monk Saki Monkey <i>Pithecia monachus</i>	White-Fronted Capuchin <i>Cebus albifrons</i>		Amazon Bamboo Rat <i>Dactylomys dactylinus</i>
Brown Capuchin <i>Cebus apella</i>	Dusky Ti-Ti Monkey <i>Callicebus brunneus</i>		Red Acouchy <i>Myoprocta acouchy</i>
White-fronted Capuchin <i>Cebus albifrons</i>	Saddle-backed Tamarin <i>Saguinus fuscicollis</i>		Green Acouchy <i>Myoprocta pratti</i>
Dusky Ti-Ti Monkey <i>Callicebus brunneus</i>	Juinin Squirrel <i>Sciurus pyrrhinus</i>		
Night Monkey <i>Aotus trivirgatus</i>	Tayra <i>Eira barbara</i>		
Squirrel Monkey <i>Saimiri sciureus sciureus</i>	Grey Brocket Deer <i>Mazama gouazoubira</i>		
Saddle-backed Tamarin <i>Saguinus fuscicollis</i>	Red Brocket Deer <i>Mazama americana</i>		
Juinin Squirrel <i>Sciurus pyrrhinus</i>	Brown Agouti <i>Dasyprocta variegata</i>		
Bolivian Squirrel <i>Sciurus ignitus</i>			
Grey Brocket Deer <i>Mazama gouazoubira</i>			
Red Brocket Deer <i>Mazama americana</i>			
Brown Agouti <i>Dasyprocta variegata</i>			
Nine-banded Armadillo <i>Dasypus novemcintus</i>			
Puma <i>Puma concolor</i>			
19 species	14 species	3 species	8 species

Appendix 2.8b. List of birds seen during the study period in the Las Piedras area.

	Common name	Latin name
	TINAMOUS	Tinamidae
1	Gray Tinamou	<i>Tinamus tao</i>
2	Great Tinamou	<i>Tinamous major</i>
3	Little Tinamou	<i>Crypterellus soui</i>
4	Undulated Tinamou	<i>Crypterellus undulatus</i>
5	Variagated Tinamou	<i>Crypterellus variegates</i>
	HERONS, EGRETS, BITTERNs	Ardeidae
6	White-necked Heron	<i>Ardea cocoi</i>
7	Great Egret	<i>Egretta alba</i>
8	Snowy Egret	<i>Egretta thula</i>
9	Striated Heron	<i>Butorides striatus</i>
10	Cattle Egret	<i>Bubulcus ibis</i>
11	Capped Heron	<i>Pilherodias pileatus</i>
12	Rufescent Tiger Heron	<i>Tigrisoma lineatum</i>
	STORKS	Ciconiidae
13	American Woodstork	<i>Mycteria americana</i>
14	Jabiru	<i>Jabiru mycteria</i>
	IBISES	Threskiornithidae
15	Green Ibis	<i>Mesembrinibis cayennensis</i>
	SCREAMERS	Anhimidae
16	Horned Screamer	<i>Anhima cornuta</i>
	DUCKs, GEESE	Anatidae
17	Muscovy Duck	<i>Cairina moschata</i>
	VULTURES	Cathartidae
18	King Vulture	<i>Sarcoramphus papa</i>
19	Black Vulture	<i>Coragyps atratus</i>
20	Greater Yellow-headed Vulture	<i>Cathartes melambrotus</i>
	KITES, HAWKS, EAGLES	Accipitridae
21	Plumbeous Kite	<i>Ictinia plumbea</i>
22	Roadside Hawk	<i>Buteo magnirostris</i>
23	Great Black Hawk	<i>Buteogallus urubitinga</i>
	FALCONS, CARACARAS	Falconidae
24	Laughing Falcon	<i>Herpetotheres cachinnans</i>
25	Red-throated Caracara	<i>Daptrius americanus</i>
26	Orange-breasted Falcon	<i>Falco deiroleucus</i>
27	Bat Falcon	<i>Falco ruficularis</i>
	CHACALACAS, GUANS, CURASSOWS	Cracidae
28	Speckled Chacalaca	<i>Ortalis guttata</i>
29	Spix's Guan	<i>Penelope jacquacu</i>
30	Common or Blue-throated Piping Guan	<i>Aburria pipile</i>
31	Razor-billed Curassow	<i>Crax mitu</i>
	TRUMPETERS	Psophiidae
32	Pale-Winged Trumpeter	<i>Psophia leucoptera</i>
	RAILS, COOTS	Rallidae
33	Gray-necked Wood-Rail	<i>Aramides cajenea</i>
	SUNGREBES	Heliornithidae
34	Sungrebe	<i>Heliornis fulica</i>
	SUNBITTERN	Eurypygidae
35	Sunbittern	<i>Eurypyga helias</i>
	LAPWINGS, PLOVERS	Charadriidae
36	Pied Lapwing	<i>Hopoxypterus resplendens</i>
37	Collared Plover	<i>Charadrius collaris</i>
	SANDPIPERS	Scolioacididae
38	Spotted Sandpiper	<i>Actitis macularia</i>

	GULLS, TERNS		Laridae
39	Large-billed Tern		<i>Phaetusa simplex</i>
40	Yellow-billed Tern		<i>Sterna superciliaris</i>
	SKIMMERS		Rynchopidae
41	Black Skimmer		<i>Rynchops niger</i>
	PIGEONS, DOVES		Columbidae
42	Pale-vented Pigeon		<i>Columba cayennensis</i>
43	Ruddy Pigeon		<i>Columba subvinacea</i>
44	Plumbeous Pigeon		<i>Columba plumbea</i>
45	Ruddy Ground-Dove		<i>Columbina talpacoti</i>
46	White-tipped Dove		<i>Leptotila rufaxilla</i>
47	Ruddy Quail-Dove		<i>Geotrygon montana</i>
48	Violaceous Quail-Dove		<i>Geotrygon violacea</i>
	MACAWS, PARROTS, PARAKEETS		Psittacidae
49	Blue & Yellow Macaw		<i>Ara ararauna</i>
50	Scarlet Macaw		<i>Ara macao</i>
51	Red & Green Macaw		<i>Ara chloroptera</i>
52	Chestnut-fronted Macaw		<i>Ara severa</i>
53	Red-bellied Macaw		<i>Ara manilata</i>
54	White-eyed Parakeet		<i>Aratinga leucophthalmus</i>
55	Dusky-headed Parakeet		<i>Aratinga weddellii</i>
56	Cobalt-winged Parakeet		<i>Brotogeris cyanopectus</i>
57	Tui Parakeet		<i>Brotogeris sanctithomae</i>
58	White-bellied Parrot		<i>Pionites leucogaster</i>
59	Orange-cheeked Parrot		<i>Pionopsitta barrabandi</i>
60	Blue-headed Parrot		<i>Pionus mentstruus</i>
61	Yellow-headed Parrot		<i>Amazona ochrocephala</i>
62	Mealy Parrot		<i>Amazona farinosa</i>
	CUCKOOS, ANIS		Cuculidae
63	Squirrel Cuckoo		<i>Piaya cayana</i>
64	Little Cuckoo		<i>Piaya minuta</i>
65	Greater Ani		<i>Crotophaga major</i>
66	Smooth-billed Ani		<i>Crotophaga ani</i>
	HOATZINS		Opisthocomidae
67	Hoatzin		<i>Opisthocomus hoatzin</i>
	OWLS		Strigidae
68	Tropical Screech-Owl		<i>Otus choliba</i>
	POTOOS		Nyctibidae
69	Common Potoo		<i>Nyctibius griseus</i>
	NIGHTHAWKS, NIGHTJARS		Caprimulgidae
70	Sand-coloured Nighthawk		<i>Chordeiles rupestris</i>
71	Pauraque		<i>Nyctiphrynus ocellatus</i>
	SWIFTS		Apodidae
72	White-collared Swift		<i>Streptoprocne zonaris</i>
73	Fork-tailed Palm-Swift		<i>Reinarda squamata</i>
	HUMMINGBIRDS		Trochilidae
74	Rufous-breasted Hermit		<i>Glaucis hirsute</i>
75	Reddish Hermit		<i>Phaethornis ruber</i>
	TROGONS		Trogonidae
76	Black-tailed Trogon		<i>Trogon melanurus</i>
77	White-tailed Trogon		<i>Trogon viridis</i>
78	Collared Trogon		<i>Trogon collaris</i>
79	Blue-crowned Trogon		<i>Trogon curucui</i>
80	Violaceous Trogon		<i>Trogon violaceus</i>
	KINGFISHERS		Alcedinidae
81	Ringed Kingfisher		<i>Ceryle torquata</i>
82	Amazon Kingfisher		<i>Chloroceryle amazona</i>
83	Green & Rufous Kingfisher		<i>Chloroceryle inda</i>
	MOTMOTS		Motmotidae
84	Broad-billed Motmot		<i>Electron platyrhynchum</i>
85	Rufous Motmot		<i>Baryphengus ruficapillus</i>
86	Blue-crowned Motmot		<i>Motmotus momata</i>

JACAMARS
87 Bluish-fronted Jacamar

PUFFBIRDS
88 Semicollared Puffbird
89 Swallow Wing Puffbird

TOUCANS, ARACARIS
90 Chestnut-eared Aracari
91 Golden-collared Toucanet
92 Yellow-ridged Toucan
93 Cuvier's Toucan

PICULETS, WOODPECKERS
94 Cream-coloured Woodpecker
95 Lineated Woodpecker
96 Yellow-tufted Woodpecker
97 Red-necked Woodpecker

WOODCREEPERS
98 Olivaceous Woodcreeper
99 Long-billed Woodcreeper
100 Cinnamon-throated Woodcreeper
101 Buff-throated Woodcreeper

SPINETAILS, FOLIAGE-GLEANERS ETC
102 Buff-throated Foliage-Gleaner

ANTBIRDS
103 Great Antshrike
104 White-browed Antbird
105 Black-faced Antbird

COTINGAS, FRUITEATERS
106 Screaming Piha
107 Bare-necked Fruitcrow
108 Purple-throated Fruitcrow

MANAKINS
109 Dwarf Tyrant-Manakin
110 Band-tailed Manakin
111 Round-tailed Manakin

TYRANT-FLYCATCHERS
112 White-cheeked Tody-Flycatcher
113 Drab Water Tyrant
114 Yellow-browed Tyrant
115 Lesser Kiskadee
116 Social Flycatcher
117 Tropical Kingbird

SWALLOWS, MARTINS
118 White-winged Swallow
119 White-banded Swallow
120 Southern Rough-Winged Swallow

JAYS
121 Violaceous Jay

WRENS
122 Thrush-like Wren
123 Nightingale Wren
124 Musician Wren

OROPENDULAS, ORIOLES, BLACKBIRDS ETC
125 Shiny Cowbird
126 Giant Cowbird
127 Crested Oropendula
128 Russet-backed Oropendula
129 Olive Oropendula
130 Yellow-rumped Casique
131 Red-rumped Casique

Galbulidae
Galbula cyanescens

Bucconidae
Malacoptila semicineta
Chelidoptera tenebrosa

Ramphastidae
Pteroglossus castanotis
Selenidera reinwardtii
Ramphastos culminates
Ramphastos cuvieri

Picidae
Celeus flavus
Dryocopus lineatus
Melanerpes cruentatus
Phloeoceastes rubricollis

Dendrocolaptidae
Sittasomus griseicapillus
Nasica longirostris
Dendrexetastes rufigula
Xiphorhynchus guttatus

Furnariidae
Automolus ochrolaemus

Formicariidae
Taraba major
Myrmoborus leucophrys
Myrmoborus myotherinus

Cotingidae
Lipauquus vociferans
Gymnoderus foetidus
Querula purpurata

Pipridae
Tyraneutes stolzmanni
Pipra fasciicauda
Pipra chloromeras

Tyrannidae
Poecilotriccus albifacies
Ochthoeca littoralis
Satrapa icterophrys
Pitangus Lictor
Myiozetetes similes
Tyrannus melancholicus

Hirundinidae
Tachycineta albiventer
Atticora fasciata
Stelgidopteryx ruficollis

Corvidae
Cyanocorax violaceus

Troglodytidae
Campylorhynchus turdinus
Microcerculus marginatus
Cyphorhinus arada

Icteridae
Molothrus bonariensis
Scaphidura oryzivora
Psaracolius decumanus
Psaracolius angustifrons
Gymnostinops yuracares
Cacicus cela
Cacicus haemorrhous

HONEYCREEPERS, DACNIS
132 Green Honeycreeper
133 Black-faced Dacnis

SWALLOW-TANAGERS
134 Swallow Tanager

TANAGERS, EUPHONIAS
135 Paradise Tanager
136 Green & Gold Tanager
137 Palm Tanager
138 Silver-beaked Tanager
139 Masked Crimson Tanager
140 White-shouldered Tanager
141 Magpie Tanager

**CARDINALS, SALTATORS, AMERICAN SPARROWS,
SIERRA FINCHES**
142 Slate-coloured Grosbeak
143 Red-capped Cardinal

Coerebidae
Chlorophanes spiza
Dacnis lineata

Tersinidae
Tersina viridis

Thraupidae
Tangara chilensis
Tangara schrankii
Thraupis palmerum
Ramphocelus carbo
Ramphocelus nigrogularis
Tachyphonus luctuosus
Cissopis leveriana

Fringillidae
Pitylus grossus
Paroaria gularis

3. A study of the Diversity of Mammals visiting a Colpa in Southeastern Peru

Emma Tatum-Hume
Piedras Biodiversity Station

3.1. Summarising Introduction

This study monitored a mammal colpa both during the day and at night in the Amazon basin of SE Peru. The diversity of species using the colpa was recorded as twelve species of mammal and eight species of bird, although further surveys, especially more nocturnal studies, are likely to increase these figures. Difficulties were encountered with nocturnal surveys as vegetation hampered the use of night scopes and mammals could not always be heard entering the colpa, making it difficult to use torches.

The most frequently seen mammals at the colpa were Junín Red Squirrel (*Sciurus pyrrhinus*) and Collared Pecarry (*Tayassu tajacu*) and the most frequently seen birds were Spix Guan (*Penelope jacquacu*) and Violaceous Quail Dove (*Geotrydon violacea*). All of the mammals recorded entering the colpa were herbivores supporting existing theories for clay consumption.

It is hoped that the results of this investigation can be used as a basis for further studies in mammal colpa ecology.

3.2. Background

Colpas are sites which herbivores and omnivores visit to ingest soil, a phenomenon known as geophagy. Geophagy is common throughout the world in wild animals as well as in livestock (Kreulen 1985) and has been reported in a wide range of species from primates to antelopes and giraffes. Previous studies have been concerned with the question of why certain mammals perform this behaviour. Many theories have been put forward, the main ones relate to geophagy alleviating gastrointestinal upsets or in supplementing minerals in the diet (Krishamani et al., 1999, Hammer 2001). In the Neotropics, studies have concentrated on parrot licks (Munn 1992, Hammer 2001), geophagy in primates (Heymann & Hartmann 1991, Izawa 1993, Müller et al. 1997) and on soil analysis (Emmons & Stark 1979). Few studies have monitored the terrestrial species using colpas. It is therefore hoped that this study will add significantly to existing on mammalian geophagy.

3.3. Methods

The colpa studied was located approximately 60 km northwest (approximate bearing 325°) along the River Las Piedras (GPS position S 12° 07.013' W 69° 54.166'). The area is accessible by boat, taking about seven hours from the nearest town of Puerto Maldonado. The area contains at least two other mammal colpas, none of which has been previously studied. The forest around the colpa is 'Terra Firma' or 'High Forest'.

The colpa consisted of a large depression in the forest floor extending back from a dried stream bed. The wall at the back of the colpa was crescent in shape extending over 10 m and was approximately 1 m high. Various tree roots were exposed in the wall and it was slightly cavernous in places where animals had scraped out the soil. The floor of the colpa was very muddy with pools of stagnant water and there were a number of obvious trails leading to the colpa from which animals entered and exited. A number of branches and small trees also overhung the colpa allowing access by tree dwelling animals.

A 3 m high platform was built 10 m from the colpa from which all observational data was collected. The platform was built from local materials one month before the start of the expedition to allow for the effects of disturbance to subside. Observers wore no insect repellent and changed shirts before entering the colpa to try and reduce the probability of animals detecting presence through smell.

The colpa was observed for 18 days during May and June 2002, including five separate 24 hour shifts. Three observers were present during daytime surveys and up to four at night, when observers worked in shifts. During the day shift, mammals entering the colpa were observed with Silva Eterna 10 x 42 and 10 x 25 binoculars or with the naked eye. During the night shifts, night scopes or torches were used. For each survey period observers recorded the names of the observers, the date, the start and end time of data collection and general weather conditions. For each mammal seen at the colpa, observers recorded the time of entry, time of exit, the species, number in the group, the time spent feeding, if it fed inside the colpa, and if so if it fed from the colpa wall or from the muddy pools on the floor, and any other additional observations.

3.4. Results

The colpa was observed for a total of 86 hours including five 24 hour periods. A total of ten mammal species and eight bird species were recorded feeding and one further mammal species, the Tapir (*Tapirus terrestris*) was identified as using the colpa from its tracks. Black Spider Monkeys (*Ateles paniscus*) are also known to feed at the colpa, but were not observed during this study, bringing the total number of mammal species using the colpa to twelve. An owl species was also observed and a possible cat species. However, these animals are likely to visit the colpa for hunting, rather than to consume soil.

Data collected was standardised in order for it to be statistically analysed. This meant that only data collected between 7:15 and 11:00 was used as this was the period which was monitored most frequently. As a result 16 time slots were analysed, a total of 63 hours and 45 minutes (see table 3.4a and figures 3.4a & b below).

Frequency of visits refers to whether a species entered the colpa during the monitoring period. If a species was seen entering more than once it was only recorded as one visit. Had each individual of the same species been counted as separate visits, frequency may have been overestimated as individuals of the same species could not be recognised. Groups of one species were counted as one visit and the total number of individuals recorded. However, it is likely from this truncating of data into time slots

and by counting species rather than individuals, that frequency of visits was underestimated. The visitation rate for mammals species was 15.99 mammal visits per 30 hours, and for bird species 6.58 bird visits per 30 hours.

Three additional species were seen entering the colpa which are not listed in table 3.4a below, as they entered outside of the times that were statistically analysed. They were Green Acouchy (*Myoprocta pratti*), observed early morning after an overnight monitoring period, Razor-billed Curassow (*Crax mitu*), seen twice both times in the afternoon and Ruddy Ground-Dove (*Columbina talpacoti*) seen feeding early morning after a night shift.

No nocturnal species were monitored entering the colpa despite carrying out five overnight monitoring sessions. This was due to the problem of using night sights in areas with vegetation. The night sights picked up on the vegetation rather than the floor of the colpa. The species seen at night were an owl species (*Manzama americana*) and a possible cat species.

Several bird species were monitored entering the colpa in pairs, namely Spix's Guan (*Penelope jacquacu*) and Razor-billed Curassow (*Crax mitu*). On several occasions *Penelope jacquacu* was monitored entering in a group of four, only once was it monitored entering alone. The squirrel species Junín Squirrel (*Sciurus pyrrhinus*) was also seen frequently entering in pairs or small groups.

Data was collected on whether the mammals and birds ate the clay or whether they were seen drinking water from the muddy pools. Mammals seen eating clay include *Sciurus pyrrhinus*, *Tayassu tajacu*, *Tayassu pecari*, *Manzama* sp., *Alouatta seniculus*, *Penelope jacquacu* and *Crax mitu*. Those seen drinking from muddy pools include *Tayassu tajacu*, *Tayassu pecari*, *Manzama* sp. and a dove species (*Geotrygon violacea*). Some mammals especially *Manzama* sp. were seen eating clay outside of the colpa that other mammals had possibly taken out of the colpa on their fur or hooves.

Many more species of mammal were seen on the transect which led to the colpa, but were never observed entering the colpa, suggesting that not all mammals need to ingest clays. Of the mammals monitored feeding at the colpa, all are known to subsist on a diet of leaves, fruits and nuts.

Table 3.4a. Species observed visiting the colpa.

	Species	Frequ- ency of visits	No	Visitation rate (visits / 30 h)	Mean group size	Length of visit (nearest min)	
MAMMALS	<i>Agouti paca</i>	2	3	0.94	1.5	11	5-21
	<i>Myoprocta acouchy</i>	3	4	1.41	1.3	7	4-10
	<i>Sciurus pyrrhinus</i>	13	21	6.12	1.6	14	2-53
	<i>Tayassu pecari</i>	2	70	0.94	35	23	10-35
	<i>Tayassu tajacu</i>	7	28	3.29	4	8	1-15
	<i>Manzama gouazoubira</i>	1	1	0.47	1	5	5
	<i>Manzama americana</i>	3	3	1.41	1	6	2-12
	<i>Alouatta seniculus</i>	1	1	0.47	4	9	9
	<i>Sciurus spadiceus</i>	2	2	0.94	1	14	3-25
BIRDS	<i>Leptotila rufaxilla</i>	1	1	0.47	1	5	5
	<i>Leptotila verreauxi</i>	1	1	0.47	1	5	5
	<i>Geotrydon violacea</i>	7	9	3.29	1.3	7	2-16
	<i>Penelope jacquacu</i>	4	9	1.88	2.25	15	1-30
	<i>Aramides cajanea</i>	1	1	0.47	1	1	1
Total Mammals	9			15.99			
Total Birds	5			6.58			

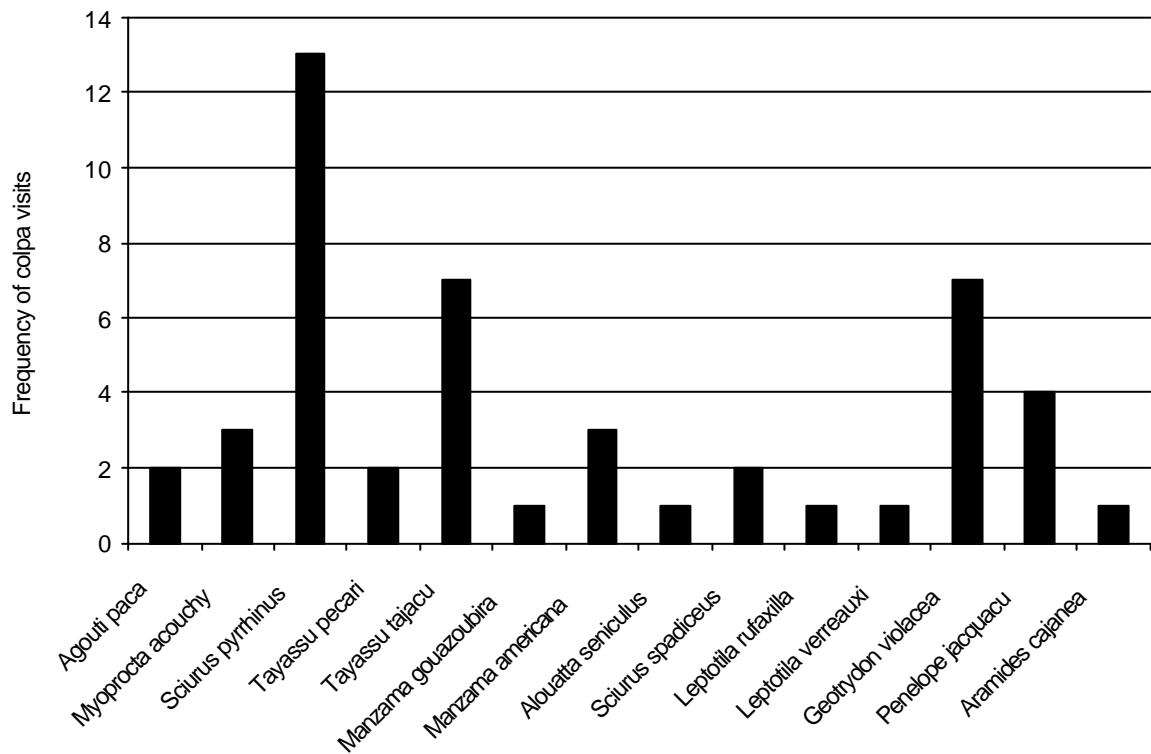


Figure 3.4a. Frequency of mammal and bird colpa visits.

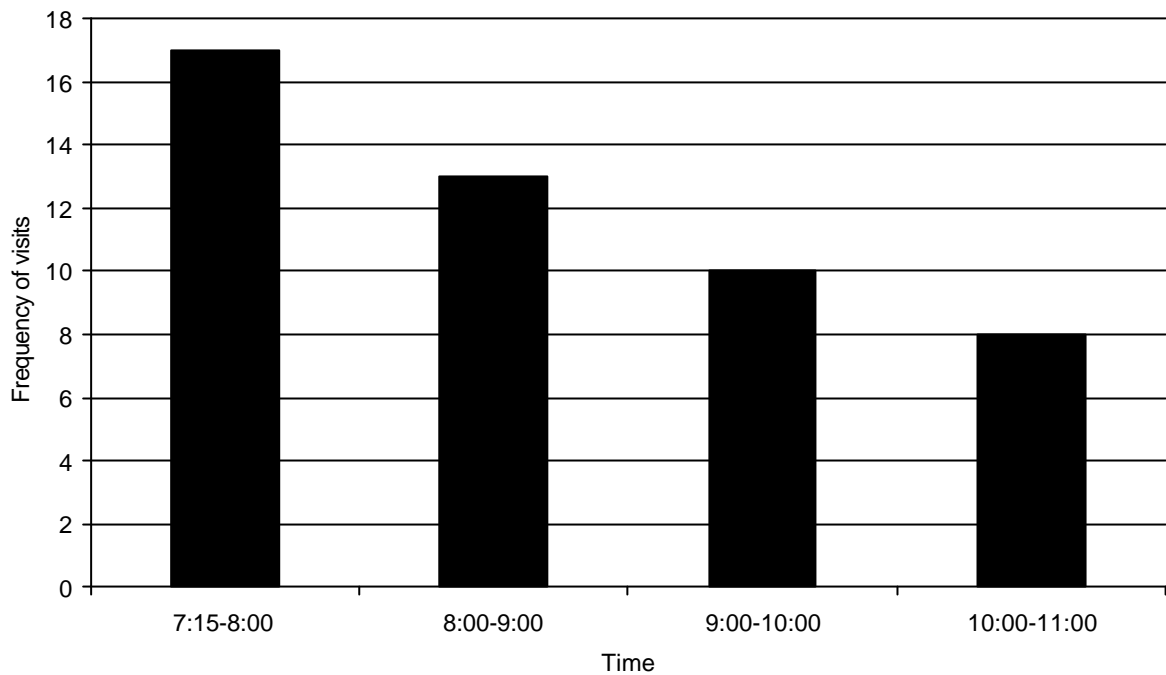


Figure 3.4b. Timing of colpa visits.

3.5. Discussion

The results suggest that the use of colpas is related to mammals and birds that have a vegetarian diet and that it is a herbivorous subset of species, rather than the wildlife population as a whole that use mammal colpas. Izawa (1993), whilst studying soil ingestion by Red Howler Monkeys (*Alouatta seniculus*) in Colombia, noted that White-lipped Peccaries (*Tayassu pecari*), Collared Peccaries (*Tayassu tajacu*), owls (*Manzama* sp.) and guans were also utilising colpas. The results presented here support existing hypotheses (Hammer 2001) for the function geophagy in that it helps alleviate gastrointestinal upsets and allows consumers to ingest a wider range of foods.

It is clear from figure 3.4b above that most colpa activity occurs early in the morning. Future studies need to begin from dawn in order to gain a more complete picture of colpa use. Further studies should also include track identification to obtain data on nocturnal colpa activity.

Species such as the Juinin Squirrel (*Sciurus pyrrhinus*) frequently entered in pairs or small groups and in between eating clay were seen displaying and playing. Likewise Spix's Guans (*Penelope jacquacu*), and Razor-Billed Curassows (*Crax mitu*) entered in pairs or groups of four and spent time preening and perching in the sun before and after eating clay. These observations suggest that for many species the colpa, apart from providing an essential clay source, also performs a social function.

The most frequent mammal visitors to the colpa were *Sciurus pyrrhinus* (6.12 visits per 30 hours) and *Tayassu tajacu* (3.29 visits per 30 hours) and the overall visitation rate for mammals was 15.99 visits per 30 hours. The overall visitation rate for birds was lower at 6.58 visits per 30 hours. In a study carried out at a colpa along the River Tambopata (Smith 1999) the overall mammal visitation rate was 3.13 visits per 40 hours which is considerably lower than the rate found at the Piedras site. The study in Tambopata was carried out in an area of the river which is protected by the government as a Reserved Zone and is considered to have a high faunal diversity and significant mammal populations. It maybe that hunting has occurred at the colpa studied in Tambopata, which affects visitation rates even today. Although hunting has occurred in the past in Piedras, it would appear that visitation rates to the colpa remain comparatively high.

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4. The Impact of Boat Traffic on the Behaviour of Parrots and Macaws at a Colpa in Southeast Peru

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4.1. Introduction

Avian geophagy or soil eating has been studied in a large number of species from Grey Louries in Botswana to parrots and macaws in Peru (Munn 1994, Hammer 2001). Avian clay licks in Amazonia are commonly located along river banks on exposed cliff faces, which contain a particular combination of clay minerals and salts. It is believed that these clays are eaten in an attempt to protect the birds from the toxic effects of compounds found in the seeds they consume, thus allowing them to eat a larger variety of seeds and/or enhance their digestibility (Gilardi & Munn 1998).

Previous studies of parrot and macaw clay licks, locally known as colpas, have rarely focused on the behaviour of the birds. Instead they have tended to concentrate on colpas located in protected areas which are characterised by low levels of or no boat traffic where birds tend to feed without human interference. However, many colpas exist outside of these protected areas. In order for sustainable populations of parrots and macaws to survive in the wild outside such conservation areas, it is necessary to study the impacts that humans have on colpa-specific bird behaviour.

The study documented here was designed to monitor the behaviour of parrots and macaws visiting a colpa beyond the confines of a protected area and investigated the effect of boat traffic on colpa activity, a factor which has not been previously studied.

The results of this study will be presented to local conservation groups in Peru in an attempt to increase awareness of the effects of boat traffic on parrot and macaw behaviour and will be used as a basis for further studies on macaw activity at colpas in the future.

4.2. Methods

The study was undertaken at a small colpa located on the banks of the River Las Piedras, approximately 60 km northwest (approximate bearing 325°) of the town of Puerto Maldonado. The colpa is approximately 15 m high and 25 m wide, its GPS position is S 12° 03.905' W 69° 53.308'. At the time of the study, the river Las Piedras received a large amount of boat traffic due to timber extraction upriver. The colpa was observed by up to three people on the opposite side of the river, a distance of about 100 m, from a temporary hide so that impact of observers' activities on the birds was minimised. Silva Eterna 10 x 42 and 10 x 25 binoculars and a Cape Instruments spotting scope were used to aid the identification of the smaller parrots, the larger macaws being easily identifiable by the naked eye.

The results reported are exclusively for the family Psittacidae which contain macaws and parrots. Other bird species, including Plumbeous Pigeon (*Columba plumbea*) and mammal species such as Red Howler Monkey (*Alouatta seniculus*) were also recorded feeding at the colpa but are not discussed further in this report.

Observations were carried out over 17 days between 24 May and 14 June 2002. The number of individuals of each species of bird entering and leaving the trees directly around the colpa were recorded, as well as their behaviour when feeding on the colpa. Boats passing the colpa were recorded and the effect they had on the birds' activities. Weather observations were also made (see Appendix 4.6).

4.3. Results

Species diversity

The colpa was monitored for a total of 84 hours. In total ten psittacid species were seen in the trees directly around the colpa and eight of these species were seen feeding at the colpa (see table 4.4a below). The most commonly seen of the smaller parrots and parakeets was the Blue-headed Parrot (*Pionus menstruus*) and the most commonly seen of the macaw species was Red and Green Macaw (*Ara chloroptera*). Of the three macaw species recorded at the colpa, only *Ara chloroptera* was observed feeding. The smaller parrots and parakeets always fed early in the morning; the latest time they were observed feeding was at 08:08 and the latest time they were seen perched in the trees surrounding the colpa was at 08:50. After this time only the larger macaw species were seen around the colpa. The macaws preferred to feed mid to late morning, the earliest time *Ara chloroptera* were seen feeding was at 08:52 and the latest at 13:45. On seven days *Ara chloroptera* were seen around the colpa before 08:00, at the same time as the parrots and parakeets, but only in small groups of two or three individuals. On average 3.3 species of psittacids were seen per day. Macaws were monitored feeding on nine occasions on eight different days over the 17 day period, and parrots on four occasions.

Effects of boat traffic

A total of 118 boats were counted passing the colpa during the monitoring period, a mean of 1.4 boats per hour. Each time a boat passed the colpa, all birds feeding would depart. Sometimes they departed when the boat was 20 m from the colpa, but more often they flew off when the boat was still over 100 m distant. Birds perched in the trees around the colpa were also often disturbed and either flew further back into the forest or flew away from the colpa altogether. The noisier the boat, the greater the disturbance – peke-peke motors with no exhaust appeared to cause the greatest disturbance. Of the nine occasions when macaws were observed feeding, eight times the birds' feeding activity was disturbed by a boat passing the colpa.

Effects of weather

Rain fell on five of the 17 monitoring days. Neither parrots nor macaws were observed feeding in the rain, but light drizzle and overcast skies did not stop them gathering in the trees around the colpa. On one occasion it rained early in the morning and then cleared up, after which macaws were observed feeding late morning, if only in small numbers. On two other days macaws were observed gathering in the trees around the colpa after rain, but were subsequently disturbed by boat traffic. The largest gatherings of parrots and macaws were seen on days with clear skies or days with sun and few clouds.

Natural behavior

When there were few boats passing the colpa, it was possible to observe the birds' natural feeding behavior. Macaws were seen to arrive in small groups and congregate in certain trees above the colpa. They often spent many hours congregating until a sufficient number had arrived, on one day for example (26 June, see appendix 4.6a below), two hours and forty minutes passed between first arrival and feeding. Once sufficient numbers had arrived, (sufficient numbers being a variable number of individuals), they began calling out and started flying into trees and vines closer to the colpa wall. In groups they were seen to circle the colpa. Large groups of macaws appeared to be more wary and more easily disturbed as group vigilance increased with flock size. Normally a small number of birds flew onto the wall and began to feed, then more would join them resulting in a burst of feeding activity that lasted between five and fifteen minutes. After the initial activity they fed in smaller numbers for a further ten minutes or more, rotating between feeding and perching in the vegetation around the colpa, waiting to feed again. Macaws were recorded feeding for long periods, staying on the lick for up to 34 minutes at a time (28 June, see appendix 4.6a). Several macaws were always seen perched in the taller trees above the colpa. If there was any cause for alarm such as a boat or a bird of prey, they issued a cry and all birds on the colpa and in the vicinity would fly off. On the one occasion when the macaws left naturally instead of being disturbed by a passing boat, they had fed for a total of 22 minutes (12 June, see appendix 4.6a below). On two occasions adult birds were seen to regurgitate clay to juveniles after feeding, providing evidence that adults still care for juvenile birds long after leaving the nest.

4.4. Discussion

A total of ten parrot and macaw species were recorded around the colpa and although not all species were observed feeding during the census, they have been seen on other occasions. This puts the diversity of parrots at this colpa at ten species. It is likely that further studies will increase this number. A diversity study carried out on a large colpa in Tambopata put the diversity at 17 species (Brightsmith & Van Houtan, 2000). This leads to the question why fewer species visit the Las Piedras colpa. Is it due to the size of the colpa itself? The colpa studied in Piedras is approximately 25 meters wide, whereas the colpa in Tambopata is over 100 m wide. Could it be that species of parrots which do not use this colpa are less social and do not like to mix with the larger more gregarious Red and Green Macaws? Or is it due to the diets of the birds and the type of clay minerals found at the colpa? The differences in the diets

of the parrots may mean that they need different types of minerals and that the clays of the Piedras colpa do not contain the minerals needed for the absent species. Blue and Yellow Macaws, for example, have been recorded feeding at colpas in Tambopata but not at the colpas in Manu National Park. It is also possible that the colpas in Tambopata contain a different mineral assemblage or a larger amount of a certain mineral necessary in the diet of these macaws, but absent from the other colpas.

All the birds seen feeding in this study fed towards the top section of the colpa. Although there are no notable soil horizons, the clay in different parts of the colpa may contain different minerals, hence the feeding preference. A soil analysis is needed to test this theory and also to compare the mineral content to the colpas in Tambopata in order to elucidate whether there is a significant difference.

The parrots also appeared to have preferred feeding times, early morning was the time for the small parrots and parakeets and mid to late morning for the larger macaws. Often the birds were not able to feed at their preferred times due to boat traffic, which appears to be very disruptive to their natural behavior. On occasions the birds had to wait for many hours before they were able to feed and sometimes they were not able to feed at all as boat traffic was too continuous. Furthermore on eight of the nine occasions that the macaws were able to feed, they were disturbed by a passing boat and hence forced to depart from the colpa before they had finished feeding. What will happen to the parrots and macaws if they are unable to consume clay? Will they look for a new colpa and move away from the area? Can parrots and macaws survive without eating the clay minerals or does long-term deficiency in clay mineral consumption damage a bird's health? Will the birds adapt their behavior and come down quicker in small groups instead of waiting to come down in one big group that appears to be more easily disturbed? Macaws and parrots are naturally wary and environmental factors such as weather and birds of prey can affect use of colpas, but there is no doubt that in this study human interference was the biggest factor in preventing the birds from feeding.

Colpas appear to be a scarce resource, especially those inside protected areas. A better understanding of parrot and macaw behavior in response to human presence is needed to ensure the long-term survival of wild populations.

Table 4.4a. Total numbers of species using the Las Piedras colpa.

English name	Latin name	MEAN	SD	No
Blue-headed Parrot	<i>Pionus menstruus</i>	31.77	25.19	13
Dusky-headed Parrot	<i>Aratinga weddellii</i>	7.75	1.71	4
Orange-cheeked Parrot	<i>Pionopsitta barrabandi</i>	3.00	-	1
White-eyed Parakeet	<i>Aratinga leucophthalmus</i>	7.00	-	1
White-bellied Parrot	<i>Pionites leucogaster</i>	3.00	-	1
Mealy Parrot	<i>Amazona farinosa</i>	5.00	1.41	8
Yellow-crowned Parrot	<i>Amazona ochrocephala</i>	8.40	9.32	5
Chestnut-fronted Macaw	<i>Ara severa</i>	2.67	0.58	3
Scarlet Macaw	<i>Ara macao</i>	4.50	2.12	2
Red and Green Macaw	<i>Ara chloroptera</i>	31.06	17.25	16
Individuals		65.53	30.18	17
Species		3.12	1.32	17

Mean and the Standard Deviation (SD) were only calculated for the days the birds were observed at the colpa. 'No' refers to the number of days on which a particular species was observed.

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4.6. Appendix

Appendix 4.6a. Avian behaviour and events at the macaw colpa.

DATE	OBSERVERS	TIME	SPECIES	NUMBER	ACTIVITY	OBSERVATIONS
24/05/02 7:15-16:15	JJ,	7.27	Blue-Headed Parrot	30	In trees above colpa	Boat with Peke-Peke motor passes and all birds take off approx 10 return a few minutes later
		7.57	Mealy Parrot	5	In trees above colpa	Noisy Peke-Peke passes and all birds take off (300m)
		8.44	Red and Green Macaws	11	In trees above colpa	
		9.16	Blue-Headed Parrot	20	In trees above colpa	
		09:50	Red and Green Macaws	4	In trees above colpa	Take off when peke peke passes (100m)
		10:00	Red and Green Macaws	15	In trees above colpa	Outboard motor passes
		10:15	Red and Green Macaws	15	In trees above colpa	Peke Peke passes and birds stay in trees
		10:25	Red and Green Macaws	5	In trees above colpa	Peke Peke passes and birds stay in trees
		11:02	Red and Green Macaws	30	In trees above colpa	Peke Peke passes and birds stay in trees
		11:25	Red and Green Macaws	20	In trees above colpa	Peke-Peke passes and macaws take off when 100m away
		11:45	Red and Green Macaws	5	In trees above colpa	Take off after boat has passed
		11:55	Red and Green Macaws	10	In trees above colpa	3 Peke-Pekes pass and birds take off
		12:32	Red and Green Macaws	30	In trees above colpa	2 Peke-Pekes pass and birds take off
		12:45	Red and Green Macaws	20	In trees above colpa	
		12:55	Red and Green Macaws	20	In trees above colpa	Peke-Peke boats pass at each of these times
		13:30	Red and Green Macaws	22	Feed	Macaws take advantage of break in the continual boat traffic of the morning and feed briefly for 15 minutes
		14:20	Red and Green Macaws	22	Feed	
		15:00	Red and Green Macaws	22	Feed	
		15:05	Red and Green Macaws	22	Feed	Peke-peke boats pass at each of these times
		15:10	Red and Green Macaws	22	Feed	
16:00	Red and Green Macaws	22	Feed			
16:10	Red and Green Macaws	22	Feed			
25/05/02 7:45 – 11:30	H,W	07:50	Red and Green Macaws	4	In trees above colpa	Peke-Peke passes and macaws take off
		07:57	Mealy Parrot	6	In trees above colpa	Peke-Peke passes and macaws take off
		08:04	Red and Green Macaws	3	In trees above colpa	3 Peke-Pekes pass, nothing to disturb
		08:10	Chestnut-Fronted Macaws	3	In trees above colpa	Arrive and stay briefly

		8:14-9:29	Red and Green Macaws	26	In trees above colpa	Arrive in small groups over a period of time
		09:42				Boat passes quickly going downstream, doesn't disturb macaws
		09:49			Fly into forest	Peke-Peke passes and many birds fly further back into the forest
		09:55				
		10:35				
		10:50				Peke-Peke boats pass at each of these times
		11:05				
		11:10				
		11:25				
						Monitoring stops. New group monitors briefly in the afternoon but no macaw activity. Total of 13 Peke-Pekes 3 species
26/05/02 7:30-15:15	H,L	07:41	Red and Green Macaws	3	In trees above colpa	Flew off as Peke-Peke passes
			Blue-Headed Parrots	11		
		08:05				Peke-Peke passes going downstream
		08:14	Red and Green Macaws			Start collecting in trees above colpa - fly in in small groups
Weather:	Sun with a few clouds	08:30	Red and Green Macaws	73		Counted in trees above colpa
		09:14	Red and Green Macaws	60	Central column of vines	Start moving from the tree tops into the vines above the colpa. Flew off and regrouped in the trees to the right of the colpa
		10:18				Start moving again into the vines above the colpa
		10:50	Red and Green Macaws	4	Feed	Feed for 4 minutes before flying off - why disturbed?
		10:57	Red and Green Macaws	30	Central Column/feed	Fly back onto central column of vines and then start to feed
		11:03	Red and Green Macaws	45	Feed	45 Feeding at one time on colpa others are gathered in a bare tree to the left of the colpa wall waiting to feed. Some macaws appear to be acting as lookouts in the trees above the colpa. Many individuals recorded feeding for upto 10 minutes.
		11:23				Peke-Peke passes going upstream, fly off colpa to trees to right
		12:10	Red and Green Macaws			Adult macaw seen regurgitating clay to young
		13:40-16:02	Red and Green Macaws	20		Peke-Peke passes going downstream macaws remain in trees
		15:08				Peke-Peke passes going downstream macaws remain in trees
						In trees behind colpa
						Peke-Peke passes downstream
						In total 6 peke-peke's 2 Species
27/05/02 9:30 – 11:30 13:45 – 15:05	E,S,B	09:30	Red and Green Macaws	19	In trees above colpa	
		09:31	Red and Green Macaws	4	Fly	Peke-Peke passes and 4 take flight
		10:26	Red and Green Macaws	26	In trees above colpa	
		10:52	Scarlet Macaws	6	In trees above colpa	

	Rain early morning so monitoring started late.	10:55	Scarlet and R&G Macaws			Start moving into vines above colpa
		11:25	Red and Green Macaws	23	Mid Column	On mid column of vines above colpa a few minutes from feeding
		11:25	Red and Green Macaws	45		Peke-Peke passes and it starts to drizzle all birds take flight
		11:28				Outboard passes 9 R&G macaws fly off
		13:50	Red and Green Macaws	13	In trees above colpa	
			Scarlet Macaw	1	In trees above colpa	
		15:03				All fly off when Peke-Peke passes 4 Boats - 3 Peke-Peke's, 1 outboard 2 species
28/05/02 7:15 – 12:45	E,F,Mi	07:30	Blue-Headed Parrot	10	In central vines	Moving down vines above the colpa
		07:52	Blue-Headed Parrot	10	Feed	Feed for 1 minute in top left part of wall - flew off no trigger
			Dusky-Headed Parrakeet	3	Feed	Feed for 1 minute in top left part of wall - flew off no trigger
		07:55	Blue-Headed Parrot	10	Feed	Fed for 4 minutes
			Dusky-Headed Parrakeet	8	Feed	Fed for 4 minutes
Weather:	Sun with a few clouds	07:58	Red and Green Macaws	2	In central vines	Were probably wanting to feed but flew off when parrots did
		08:08	Blue-Headed Parrot	1	Feed	1 parrot continued to feed alone in the hole in the colpa wall
		08:30	Red and Green Macaws	9	In trees above colpa	Flew off - 3 remained
		08:35	Red and Green Macaws	7	In trees above colpa	Arrive
		08:38	Red and Green Macaws	2	In trees above colpa	Arrive
		08:45	Red and Green Macaws	4	In trees above colpa	Arrive
		08:49	Red and Green Macaws	5	In trees above colpa	Arrive
		08:52	Red and Green Macaws	1	Feed	Flies onto lick and feeds for 34 minutes
		08:57	Red and Green Macaws	1	Feed	Flies onto lick and feeds for 29 minutes
		09:18	Red and Green Macaws	2	Feed	Flies onto lick and feed for 8 minutes
		09:23	Red and Green Macaws	9	Feed	Fly onto lick
		09:24	Red and Green Macaws	20	Feed	20 on wall and approx another 10 in vines above and around
		09:26	Red and Green Macaws	26	Feed	A total of 26 birds feeding towards the top part of the lick
		09:26	Red and Green Macaws			All fly off as Peke-Peke and outboard motor go past
		09:30				Peke-Peke
		10:32	Plumbeous Pidgeon	2	Feed	Feed in hole of wall of colpa 1 indiv for 6 mins other for 9 mins
		11:25	Red and Green Macaws	40+	Collecting in trees	During last half hour macaws flying in in small groups to trees above the colpa at 11:25 begin to vocalise and move down towards the colpa
		11:33	Red and Green Macaws	40+		Group is disturbed by roadside hawk that flies past, most macaws gather again in trees above the colpa
		11:42	Red and Green Macaws	approx 31	In trees to right of colpa	Group appears to be gathering to feed above a smaller colpa to the right of where we are monitoring
		11:46	Red and Green Macaws	approx 31	Feed?	Some of the group may have started to feed at smaller colpa

		11:50	Red and Green Macaws	60	Flying	Whole group is disturbed and some 60 birds take off
		11:57	Red and Green Macaws	6	In central vines	Start to gather above the colpa
		12:00	Red and Green Macaws	31	Feed	All at once start to fly onto colpa and feeding frenzy occurs for the first 5 minutes then the group calms down
		12:13	Red and Green Macaws	31	Disturbed	Group flies off colpa for unknown reason but come almost straight back onto wall to feed. Scared by cry given by one of the birds perched in the taller trees above the colpa.
		12:23	Red and Green Macaws	14	Feeding	Numbers are lower now that frenzy has died down
		12:36	Red and Green Macaws		Disturbed	Peke-Peke passes and remaining birds fly off. One individual stays on lick until the boat is almost level and then flies.
		12:40	Red and Green Macaws	7	In trees above colpa	Only a few birds remain 4 Boats - 3 Peke-Pekes, 1 Outboard 3 species
29/05/02 7:15 - 10:30	Sa,S,M Rain after 10:30am	07:30	Blue-Headed Parrot Mealy Parrot Dusky-Headed Parrot	approx 50 in total of all 3 Sp	In trees above colpa	Remained in trees as Peke-Peke passed but took flight 15 minutes later
		08:10	Red and Green Macaws	5	In trees above colpa	Arrive
		08:48	Red and Green Macaws	8	In trees above colpa	Arrive
		08:50	Red and Green Macaws	11	In trees above colpa	Arrive
		09:15				Peke-Peke passes but macaws don't fly until a few minutes later
		09:40	Red and Green Macaws	8	Low in trees above colpa	Fly from other side of river straight into low canopy trees
		09:50	Red and Green Macaws	3	Feed	Fly straight from trees to colpa wall. Appears to be 2 adults and a juvenile as adults seen giving clay to young
		10:05	Red and Green Macaws	5	Feed	5 more feeding = 7 in total. Feed for approx 3 minutes
		10:07	Red and Green Macaws	2	Vines above colpa	Fly into vines Outboard motor passes and all birds take flight 3 boats, 2 Peke-Peke's, 1 Outboard Cloudy and rainy for rest of day - monitoring stops 4 Species
30/05/02 7:15 - 14:00	JJ,K,L	07:30	Blue-Headed Parrot	20	In trees above colpa	
		07:35	Blue-Headed Parrot			Flew off when Peke-Peke went past
		08:25	Red and Green Macaws	4	In trees above colpa	Arrive
		08:40	Red and Green Macaws	4		Leave
		08:45	Red and Green Macaws	2	In trees above colpa	Arrive into trees to right of the colpa
		09:15	Red and Green Macaws	3	In trees above colpa	Arrive into trees to left of colpa
		10:00	Red and Green Macaws	4	In trees above colpa	Arrive into trees above colpa

	Ma,Mi	10:15	Red and Green Macaws	6	In trees above colpa	Starting to move down vegetation towards colpa
		10:25	Red and Green Macaws	18	Feed	Feed in the top part of the colpa wall
		10:35	Red and Green Macaws	21	Feed	21 birds around the wall but only 13 feeding at one time
		10:40	Red and Green Macaws		Disturbed	Disturbed by Peke-Peke passing, 8 fly off
		12:50	Red and Green Macaws	13		Rest flew off
		13:00	Red and Green Macaws	2	In trees above colpa	To left of colpa
		13:23	Red and Green Macaws	10		Flew off
		14:00				Group leaves as no macaws at colpa 2 Peke-Pekes 4 Species
31/05/02 7:30 - 8:25	Rain stops monitoring	07:35	Mealy Parrots	2	In trees above colpa	
		07:40	Mealy Parrots	2	In trees above colpa	Arrive
		08:00	Mealy Parrots	4		Fly off as Peke-Peke passes 1 Peke-Peke 1 Species
06/06/02 7:15 - 12:45	E,W,S	07:15	Blue-Headed Parrot	approx 60	In trees above colpa	Flew off in small groups as we arrived
		07:23	Yellow -Crowned Parrot	1	In vines above colpa	Feeding on fruits in the vines above the colpa
		07:23	Blue-Headed Parrots	approx 97	In vines above colpa	Starting to fly into vines from trees above
		07:25	Roadside Hawk	1		Flew past colpa and landed in tree nearby. All parrots flew off
		07:36	Red and Green Macaw	1		Arrived to trees above colpa
		07:58				
		08:24				
		08:26				All times of Peke-Pekes passing
		08:42				
		08:56				
		09:30	Red and Green Macaw	2	Fly in	Arrived to trees above colpa
		09:35				Peke-Peke
		09:40				Peke-Peke
		09:41	Red and Green Macaw	10	Fly in	Arrived to trees above colpa
		09:50				Peke-Peke
		10:02	Red and Green Macaw	18	Fly away	Flew off for no obvious reason
		10:04	Red and Green Macaw	9	Fly in	Arrived to trees above colpa
		10:15	Red and Green Macaw	8	Fly in	Arrived to trees above colpa
		10:35	Red and Green Macaw	20		Peke-Peke passes and macaws take flight

		11:36	Scarlet Macaw	3	Fly in	Arrived to trees above colpa
		11:59				Outboard motor passes
		12:26				Peke-Peke passes
		12:34	Scarlet Macaw	3		Fly off
						12:45 Monitoring stops - 8 Red and Green Macaws in canopy
						11 boats, 10 Peke-Pekes, 1 Outboard
						4 Species
07/06/02	H,L,A	07:08	Blue-Headed Parrots	21		Low in foliage above colpa
7:00 - 13:00			Mealy Parrots	8		In trees above colpa
		07:25	Red and Green Macaws	2		In trees above colpa
		07:37				Peke-Peke passes all birds disturbed
		07:43				Peke-Peke passes
		08:09	Red and Green Macaws	13		Arriving in small groups
		08:17	Chestnut-Fronted Macaws	3		Flew into canopy trees but stayed only briefly
		08:27				Peke-Peke downstream. All macaws fly off
		08:32				Peke-Peke downstream. No macaws to disturb
		08:35	Red and Green Macaws	1		Arrives to trees above colpa
		08:40				Peke-Peke passes
		08:46	Red and Green Macaws	6		Arrive to trees above colpa
		09:00	Red and Green Macaws	8		Arrive to trees above colpa
		09:03				Peke-Peke passes no disturbance
		09:34	Red and Green Macaws	4		Arrive to trees above colpa
		09:40				Sun comes out and macaws become more active
		09:43				Peke-Peke downstream 3 macaws fly off
		09:57				Peke-Peke passes downstream
		10:02				Peke-Peke passes downstream
		10:49	Red and Green Macaws	1		Flew into foliage just above the colpa
		10:53	Red and Green Macaws	6		Flew into mid-foliage above the colpa
		10:54	Red and Green Macaws	1	Feed	Flew onto colpa
		10:57	Red and Green Macaws	15	Around colpa	1 feeding, 6 in foliage above colpa, 5 on vines to the right of the colpa and 3 in the trees above the colpa
		11:01	Red and Green Macaws	2	Feed	3 in total feeding
		11:05	Red and Green Macaws	1		Flies from trees vines above colpa
		11:06	Red and Green Macaws	1		Flies off colpa
		11:07				Peke-Peke disturbs macaws and 12 fly up from vegetation around

		11:40	Red and Green Macaw	2		colpa and into trees above
		12:10	Red and Green Macaw	2		Fly further into forest behind colpa
		12:40				Arrive to trees above colpa
		12:55				Peke-Peke passes 10 R&Gs fly off
						Peke-Peke passes
						Monitoring stops at 1pm - only 2 R&Gs left
						12 Peke-Peke's
						4 Species
08/06/02 6:40 - 11:15	JJ,C,L	06:42	Blue-Headed Parrot	29	In trees above colpa	Starting to move down vines above colpa
			Mealy Parrot	4	In trees above colpa	
		06:58	Red & Green Macaw	3	In trees above colpa	Arrive into canopy trees
		07:00	Dusky-Headed Parakeets	6		Feeding in top third of colpa
			Mealy Parrot	4	Feed	
			Blue-Headed Parrot	50	Feed	
		07:05	Red & Green Macaw	1		Moves into lower branches above colpa
		07:14	Blue-Headed Parrot			Flew off colpa
			Mealy Parrot			
		07:15	Mealy Parrot	4		Flew away
		07:23	Blue-Headed Parrot	aprox 50		Flew away
		07:24				Peke-Peke passed - downstream
		07:37				Peke-Peke passed - upstream
		08:09				Outboard - downstream
		08:13	Red & Green Macaw	4	In trees above colpa	Flew into trees
		08:28	Red & Green Macaw	2	In trees above colpa	Flew into trees
		08:35	Red & Green Macaw	4	In trees above colpa	Flew into trees
		08:36				Peke-Peke passed
Weather	Cloudy with light breeze	09:00				Peke-Peke passed
		09:43	Red & Green Macaw	18		Circle and land again in canopy trees
		09:43	Red Howler Monkeys	3	Feed	Fed for 8 minutes near to the top of the colpa whilst hanging from the central vines
		09:49				Peke-Peke
CHECK		10:00	Red Howler Monkey	3		Leave colpa and climb up central vines
		10:19	Red & Green Macaws	3		Fly into trees to right of colpa
		10:25	Red & Green Macaws	9		Fly into trees above colpa
		10:36	Red & Green Macaws	2		Move into low trees to right of colpa
		11:01	Red & Green Macaws	1	Feed	Feeding in top center part of colpa wall
		11:02	Red & Green Macaws	2	Feed	
		11:05				Peke-Peke passes macaws feeding and another 23

		11:08				macaws around the colpa fly off Peke-Peke passes Monitoring stops at 11:30 - no macaws left around colpa 8 Boats - 7 Peke-Peke's, 1 Outboard 4 Species
09/06/02 6:30 - 12:30	H,P,L	06:40	Blue-Headed Parrots Mealy Parrots	20 4		In central column of vegetation Mealy parrots flew off shortly after monitoring began Peke-Peke passes Gathering in increasing numbers in vines above colpa Peke-Peke passes and Blue-Headed Parrots fly off In trees to right of colpa Peke-Peke passes and all parrots fly off Arrive in small groups to the trees above the colpa Peke-Peke passes and all parrots fly into trees further back into the forest Peke-Peke passes - no birds to disturb 6 Peke-Pekes pass but no birds come back to disturb 11 Peke-Pekes 5 Species
Weather	Cool, misty early morning then sunny with clouds	07:02 07:42 07:47 07:57 08:10 09:56 09:58 10:36 10:44 to 12:14	Blue-Headed Parrots Dusky-Headed Parakeets White-Bellied Parrots Red & Green Macaws	25 7 3 31		
10/06/02 6:30 - 10:13	S,W,A	06:40 06:46 06:52 06:54 07:04 07:11 07:14 07:17 07:20 07:25 07:39 07:45 07:55 08:52 09:03 09:24 09:47	Yellow-Crowned Parrots Yellow-Crowned Parrots Blue-Headed Parrots Blue-Headed Parrots Mealy Parrots Yellow-Crowned and Blue-Headed Parrots Blue-Headed Parrots Blue-Headed Parrots Blue-Headed Parrots Blue-Headed Parrots Blue-Headed Parrots Blue-Headed Parrots Blue-Headed Parrots Blue-Headed Parrots Red & Green Macaws Red & Green Macaws Red & Green Macaws Red & Green Macaws	20 14 21 6 4 approx 70 in total 10 10 20 approx 70 15 6 3+1 3+2+4 3 5		Flew off from trees above the colpa Landed in trees to left of the colpa Landed in trees to left of the colpa Landed in trees to left of the colpa Landed in trees to right of the colpa Take flight and circle the colpa then land in various trees above the colpa Fly into vines above the colpa Move back into trees Circle the colpa but then fly off Fly off and only 25 return Fly off Outboard motor and peke-peke pass 28 Blue-Headed fly off Flew off - none left Flew into trees above colpa Small groups flew into trees above colpa Flew away from the colpa Loud Peke-Peke passed and 5 R & G flew off
Weather	Overcast & rain					

		09:53 10:07 10:13	Red & Green Macaws Red & Green Macaws	4 2+2	Rain	Flew into trees above colpa Flew into trees above colpa Rained until late afternoon - monitoring stopped 3 Boats - 2 Peke-pekes, 1 Outboard 4 Species
11/06/02 13:10-13:50	W,J,H Rain in morning Dark and overcast	13:20 13:37 13:57	Red & Green Macaws Red & Green Macaws Red & Green Macaws	40+ 9+3 1	Rain all morning	In trees above colpa but flew off approx 10 minutes after monitoring began Flew off, 3 left in canopy trees Peke-Peke passed, 1 R & G flew off. Monitoring finished at 2pm. 1 pair left 1 Peke-Peke 1 Species
12/06/02 6:45-12:15	W,C Blue Skies,	07:00 07:10 07:30 07:35 7:15-7:40 8:15-9:10 09:25 09:28 09:50 09:57 10:20 11:00 12:10	Blue-Headed Parrots Yellow-Crowned Parrots Chestnut Fronted Macaws Orange-Cheeked Parrots White-eyed Parakeets All species Red & Green Macaws Red & Green Macaws Red & Green Macaws Red & Green Macaws Red & Green Macaws Red & Green Macaws Red & Green	30+ 3 2 3 7 2 32 28 28 11 38 27	Feed Feed Feed Feed Fly in Central vegetation Feed	Fed for 25 minutes towards the top of the colpa wall Fed for 5 minutes Fed for 15 minutes Fed for 15 minutes Flew off the colpa wall Flew into trees above colpa but left as Peke-Peke approached Peke-Peke broken down in farm entrance downstream from the colpa Flying into canopy trees in small groups Moving down vegetation above colpa wall Feed for between 15 and 22 minutes. Lots of noise and activity, birds feed for short periods and fly off and others take their place on colpa wall. Those not feeding are hanging from the vines around the colpa wall or flying in and out from a tree to the right of the colpa Feeding activity has calmed down and 11 still feeding Fly off from colpa wall and vegetation around colpa, circle and land in the trees above the colpa Peke-Peke passed, 1 macaw flew off, movement among the rest Peke-Peke passed, 10 macaws fly off Flew away from the colpa area Monitoring finished at 12:25 3 Peke-Peke's 6 Species
13/06/02	Li,H,J	06:35	Yellow-Crowned Parrot	4		In trees above colpa when monitoring started

6:30 - 12:15	Weather	First day of a friaje ie overcast and cold	06:43	Blue-Headed Parrot	2	Vegetation above colpa	Flew into trees above colpa
			06:44	Blue-Headed Parrot	2		Flew into trees above colpa
			06:44	Yellow -Crowned Parrot	15 + 2		Flew into trees above colpa
			06:52	Blue-Headed Parrot	14+1+1		Parrots begining to move from trees into vegetation above colpa
			07:10				Peke-Peke passed and some birds flew off
			07:30				All parrots flew off from the vegetation above the colpa
			08:08	Blue-Headed Parrot	10 in total		Flew into dead tree to left of the colpa
				Yellow -Crowned Parrot			
			08:20	Blue-Headed Parrot	20		Flew into vegetation above the colpa
				Yellow -Crowned Parrot	4		
			08:25				Peke-Peke passed all parrots took off only 2 blue-headed remain in dead tree
			08:28	Blue-Headed Parrot	2		Fly off from dead tree
			08:49	Blue-Headed Parrot	13		Fly back into trees above the colpa
			08:50				Peke-Peke passed all parrots took off
			08:57				
			09:00				
			09:01				All times off Peke-Pekes passing - no birds to disturb
			09:07				
			09:45				
			09:55	Red & Green Macaws	2		Flew into trees above colpa
			10:03	Red & Green Macaws	3		Flew into trees above colpa
			10:05	Red & Green Macaws	2		Flew into trees above colpa
			10:08				Peke-Peke passed
			10:14				Peke-Peke passed
			10:20	Red & Green Macaws	3		Flew into trees above colpa
			10:32	Red & Green Macaws	1		Flew into trees above colpa
			10:35	Red & Green Macaws	2		Flew into trees above colpa
			11:00	Red & Green Macaws	5		Flew into trees above colpa
11:08	Red & Green Macaws	2	Flew into trees above colpa				
11:16	Couviens Toucan	5	Flew into trees with macaws - v noisy				
11:31	Red & Green Macaws	2	Flew into trees above colpa				
11:45	Red & Green Macaws	4	Flew into trees above colpa				
11:48	Red & Green Macaws	2	Flew into trees above colpa				
11:50			Outboard motor passes only a few birds took off				
12:00	Red & Green Macaws	29	Took off for no obvious reason				
12:10	Red & Green Macaws	7	Flew back but into trees behind the colpa				
			Monitoring finished at 12:30				
			11 Boats - 10 Peke-Peke's, 1 Outboard				
			3 Species				

14/06/02 6:45 - 11:50	JJ,La,S	07:06 07:43 08:01	Blue-Headed Parrot Blue-Headed Parrot	10 5	Feed	<p>In trees above the colpa Fed for 18 minutes Peke-Peke passed birds on colpa flew off but two stayed on the lick until the boat had passed Flew into trees above the colpa Flew into trees above the colpa but only stayed 3 minutes Flew away.</p> <p>At 11:50 monitoring stopped - 2 macaws left in trees 1 Peke-Peke 3 Species</p>
Weather	Second day of the friaje	10:05 10:14 11:25	Red & Green Macaws Yellow -Crow ned Parrot Red & Green Macaws	2 + 4 1 4		
						<p>IN TOTAL SEEN = PARROT SP 5, PARAKEET SP 2 MACAW SP 3 IN TOTAL FED = PARROT 4, PARAKEET 2, MACAW 2</p> <p>118 Boats = 110 Pokes, 8 Outboards 6.9 boats per day or 1.4 boats per hour monitored 3.3 Species per day</p>

5. Expedition Leader's Diary (by Helen Boulden)

Saturday 18th May

Finally arrived at camp yesterday, safe and sound. Our whistle-stop tour of Lima, Cusco, and Puerto Maldonado had been spectacularly problem free - far, far too good to be true, as Matthias was apt to remind me constantly. We also took in some awesome views over the Andes and the jungle, just to wet my appetite for the weeks ahead.

In Puerto (Maldonado) we did some last minute purchasing with JJ (one of the owner's of our camp) around what seemed to be every market-stall and shop, buzzing around the town on motorbike taxis, and stocking up on all number of weird and wonderful commodities - "flipas-flopas", machetes, a battery for the solar system, wash bowls and potatoes.

Our boat ride to camp took the best part of the following day, and was a great introduction to the flora and fauna of the Rio Las Piedras (river of stones). White Caiman, turtles, vultures, macaws, Black Skimmers and Yellow-billed Terns all put in an appearance, and without a hitch we reached our final destination.

Stepping off the boat and entering the forest for the first time was great, especially as the first thing I saw was a troop of Brown Capuchin monkeys, and later several Red and Green Macaws flew noisily over. One thing though which was rather a shock and made sense of our good fortune so far, was the status of the lodge, aka the building site!! Potentially the place looked great with large thatched communal, sleeping, and washing areas, and a separate kitchen hut, but with only 3 days till the first team's arrival, things seemed a tad critical.

Our first night flickered with distant lightning, which turned out to be a sign of things to come. And the Howler Monkeys more than made themselves known, or was that Matthias snoring?

Next day, today, rained and rained and hampered the work going on all around at the camp, with Emma frantically getting the beds and bedroom area ready, as well as one poor guy left to dig the deepest and longest trench for the toilets, known to man.

Things certainly looked a lot homelier by the end of the day, with a bookshelf erected, lamps up and plants dotted about. But a lot of the fundamental work still needs to be done if we are to be able to offer the basic amenities promised. We will have to hope and pray that they will be in place on our return here with the group on Monday.

Sunday 19th May

Spent last night celebrating Pedro, the carpenter's, 21st birthday. This involved sharing a bottle of rum with Emma and the boys, and getting bitten to death by mosies. I now have a pretty impressive collection of bruises, blisters and bites, so God knows what I'll be like by the end of the month.

Went on a path-clearing mission with Emma this morning, only to find that we couldn't locate the start of the newly cut 5km transect! Had fun with the machete though and found fresh Tapir tracks and Peccary scratches in the mud, plus enormous termite nests and several Red and Green Macaws. I'm sure the transect will turn up (!) or else our first group are going to be swash-buckling with the vines and lianas for the first few days at least while we cut another one.

Our boat trip back to Puerto was again rewarding with a brilliant view of a King Vulture that had come down to eat by the river, and is a very rare sight. The weather was less impressive though, and it rained and gusted a lot of the way. We picked up Roxanna en route, who is the resident nurse in a nearby village, and gave her a lift back to Puerto. Our boat is by far the quickest thing on the river, and the normal "peke-peke" motored boats (named after the sound of the engine) take on average 2 days to travel to our base, instead of the 7 hours we take.

There is considerable traffic up and down the river Las Piedras and the Madre de Dios rivers due to a recent free-for-all on Mahogany harvesting. The effects of which on the feeding behaviour of both mammals and birds, we are going to attempt to encompass in our research strategy.

Got back to Wasai Lodge extremely sweaty and dirty only to discover that 7 out of 9 of the team had already arrived and were sitting in the dining area - I must have looked terribly dashing - not!

They all seem an excellent bunch and we had a nice evening going around the market and having a meal out together. Sadly and unusually I have retired early because I am completely cream-crackered, with lots of hard work ahead no doubt.

Monday 20th May

First day proper, and it feels like we've already been here a month.

Mass exodus from the lovely Wasai Lodge which is now fully booked, and onto the seemingly pleasant "Libertador" on the other side of town. Everyone seems to be in good spirits and excited about the adventure ahead of them. All in all, a cheery bunch, with only a couple of little rain clouds amongst the sunbeams!

Emma gives the team a briefing for the work ahead, which goes down really well. I know that I'm really going to enjoy working with Emma and JJ as they are always smiling and go out of their way to be helpful, and to share their wealth of knowledge about the area and its wildlife.

Got through my first team briefing session, relatively unscathed, and without anyone passing out after hearing the Risk Assessment, which outlines all the eventualities they could encounter in the jungle.

I was extremely pleased about this, as there are a lot of scary areas covered, not least the likes of deadly snakes and diseases such as Leishmaniasis. The mere fact that no-one turned a funny colour, or ran out of the room screaming, made me feel I had achieved the task of reassuring the team that they would be safe from harm if they took heed of our advice.

Yet more shopping and a couple of nice meals later, things soon took a less convivial turn, as our Hotel proved to be a house from hell, the likes of which often grace TV these days in the form of dodgy B+B's in Margate. The boys' patterned red shower-curtain had run to give the same effect as that on the set of Psycho. Bob woke up after a nap to find a Gecko on his arm. Michelle was in the shower when all the lights went out for 10 minutes, and the piece-de-resistance, at about 10pm we lost all water in the toilets and showers, marvellous.

The rain clouds became blacker still when a group of "musicians" struck up their pipes and bongos in the streets outside our bedroom windows. I hope that at breakfast there won't be too many grumpy faces, but as the guy at the hotel says, "this is the jungle".

Tuesday 21st May

A truly eventful day. All started extremely well, sunshine but not too hot. Got to the boat in a minibus with little fuss. The boat looks swell. First half of the journey is extremely good with sightings of caiman, both white and black - a really rare treat - and also brilliant views of Squirrel Monkeys and Brown Capuchins in trees right beside the river bank - awesome. We also saw a whole tree full of Scarlet Macaws, and two separate families of Capybara on the banks of the Rio de las Piedras.

Then suddenly, the weather made a serious turn for the worse and soon it was hammering down, the wind got up and the temperature dropped. We had entered "Friaje" territory, a sudden cold spell that can occur this time of year and can hang around for up to 8 days.

Apart from the discomfort, this also made steering the boat through the sandbanks extremely hard work, and on several occasions we became marooned and had to jump in and push ourselves off the flats.

The rest of the journey, needless to say, was rather long and arduous, and I was extremely grateful to finally reach the lodge.

Thankfully, when we did arrive, we found that the staff had worked extremely hard in our absence, and had put up all the remaining walls and completed the bathrooms - luxury.

Everyone seems really pleased with the set-up and we had an excellent first dinner of spaghetti bolognese!

I am soooooo exhausted and feel like I am still on the boat, swaying to and fro. Hopefully by tomorrow the weather will have cleared so that we can start getting some good data for the project.

Wednesday 22nd May

Praise the Lord, the weather picked up today, although it was still only around 20 degrees, making the jungle seem more like an English woodland gone out of control.

Tried out the short transect to the mammal colpa (feeding area) in the morning and the team had their first machete swinging practice. Everyone was quite conservative with their attempts, but by the afternoon Gail and Will were hacking their way to the macaw colpa with gusto.

Saw a lot more Squirrel Monkeys today, which I have a real soft spot for with their pretty black and white faces and delicate movements and chirps.

Got to the hide overlooking the colpa and found Tapir tracks bang underneath, so I've great expectations for this study - fingers-crossed.

In the afternoon we split into teams and my group had the short transect to mark, not my forte I now know!

After getting in a bit of a muddle (understatement) we eventually got underway, and tomorrow we will finish it off without too many more tangles, I hope.

Sadly the other transect has not been located yet which may prove problematic, third time lucky tomorrow.

We all wondered around after dinner trying out night-sights, and JJ caught Lucio, the cook, getting changed for bed, oops.

Tomorrow will be the first night-shift at the hide, I hope we'll be seeing lots of mammal activity there.

Thursday 23rd May

Spent the morning completing the measuring of the short transect and heard Dusky Titi Monkeys dueting as we went along. On arrival at the colpa hide we found two beautiful large red squirrels eating the clay - our first examples of geophagy - the process thought to detox a bird or animal's diet.

In the afternoon we did some macheteing to clear the longer transect route - a thankless task, but good for releasing any angst or frustrations, and key to Matthias' weight-loss programme.

On our way back to camp we found a Tarantula with young in its nest, pointed out by our new boat-driver, Antonio.

Everyone is working very hard and spirits are pretty high, despite the blisters and aching bones. Looking forward to my first stint in the colpa hide tomorrow morning.

Friday 24th May

Got up dead early, 04:30, mainly because of some huge noisy bats whizzing around my tent, but also because we had to be at the hide to relieve the night shift.

Bob and I settled down to business and were soon rewarded with sightings of squirrels and Spix Guans - large turkey like birds - feeding on the clay. Time went by and then a huge commotion ensued as a large herd of White-lipped Peccaries filled the colpa. They stayed around for another 35 minutes foraging and wallowing around in the mud, and brought with them the smell of rotting burgers, nice, which later made Linda's eyes water. Bob nearly brained one when his binoculars fell from the hide, but luckily this didn't cause too much disturbance.

We had a brief but exciting glimpse of four Spider Monkeys hanging from some trees to the rear of the colpa, their small red faces and elongated limbs clearly visible. Hopefully they will come closer in time.

I now have a breather before continuing with the night-shift after dinner.

Saturday 25th May

Spent the morning at the macaw colpa and saw lots of activity. Twenty Green and Red Macaws stayed in the trees very close to the feeding area, but never came down due to all the boats travelling up and down the river, transporting logging crews. Other parrots were also close by: Blue-headed Parrots, Mealy Parrots and Chestnut-fronted Macaws, all of which were prevented from feeding at the "clay-lick" because of the noisy boats passing close by.

Hopefully this discovery will provide excellent data for the authorities on the adverse effects logging is having on the area's ecology.

Sunday 26th May

Had a fantastic start with over 60 macaws at the colpa, making one hell of a din, and eventually they made it down to feed, which is a real triumph for our chosen site of study. The key was that there were no boats passing, possibly because it is a Sunday, which gave the birds enough time to feed.

All the trees were full of large red squawking birds and in the sun they were a beautiful sight.

At the mammal hide they were also extremely lucky with Howler Monkeys coming to eat the clay, and some Collared Peccaries.

The machete teams are putting up a heroic battle against the undergrowth, and I am amazed at everyone's stamina considering the heat and humidity. They will all be "super-macho" (the name of a pizza in Puerto) by the time they return home.

Leaf-cutter Ants have now invaded the camp in a very neat and orderly fashion, if only we could train them to carry our rucksacks and march along with us everyday.

Last night there was a startlingly bright full moon, which made the jungle seem like a lunar landscape or other-worldly, especially with all the bats and fire-flies in the air, I felt really privileged to be sitting in the middle of it all.

Monday 27th May

Peccary-schmeckary. Today we saw many at the colpa, including a group of females suckling their young. Unfortunately we must be starting to whiff even more than the Peccaries, as the second group took one sniff and stampeded off in the opposite direction. Must scrub harder.

Little additional activity and the weather was extremely variable. Several macaws at the clay-lick, but none came down to feed.

We have finally finished our machete-hacking, just in time, as half the team are wondering around with twitchy arm muscles and I'm worried they may accidentally chop down their bed-posts in the night.

The trail will now be ready to use for the transect, after allowing a day to settle. So far several species of mammal have already been seen there, and that it is during all the chaos of slashing and hacking, so it looks really promising..

Tuesday 28th May

Set off for the night-shift at 20:00 in the pitch dark, after reports of a possible jaguar sighting an hour earlier along the trail. Intelligent? Probably not my smartest move ever. As Sarah said at dinner, if anyone spots a large cat with a glow in the middle, spare a thought that it may be one of our head-torches, with one of us still attached.

No glimpse of jaguar eye-shine was to be found, nor the armadillo that had also been seen snuffling along earlier in the evening. Apart from a couple of curious bats we reached the colpa unscathed, and full of admiration for the organic architecture around us. By torchlight the forest mirrored the dark interiors of gothic cathedrals, the massive buttresses of the Kapok trees, the great columns of the Castaõas, and the spectacular fan vaulting of the palm tree leaves forming our ceiling.

Alas, play was stopped because of rain. A few hours after we reached the hide, it pelted down with rain until 05:00. The night-sights proving to be quite ineffective at penetrating the foliage, so there was little else to do but sleep for most of the time. We were relieved at 07:00 and wearily made our way back to camp. The rain had brought out the tiniest of frogs and JJ and Steve saw a black and green poison frog on the walk to the hide, as well as a long yellow snake, yet to be identified. I caught a quick glimpse of the tail of a retreating snake too, small and brown, could it have been the deadly Fer-de-lance?

Emma had a satisfying day with the macaws, getting shots of many Green and Reds coming down to feed, as well as Blue-headed Parrots, and Dusky-headed Parrots feeding for the first time.

Today is perfect clothes drying weather, sunny and dry so everyone is frantically getting their clothes washed and out on the line before it changes again.

Wednesday 29th May

Another night of distant thunder and lightning. Spent the morning walking the newly completed transect and found Spix's Guans (a large turkey-like bird) and Saddle-backed Tamarin monkeys on the way back.

Tempted a Velvet Black Tarantula out of its hole. And later found two very large snakeskins down near the port, where the day before another Black Caiman had been seen.

Peccary update - they are closing in! At lunchtime it seemed they had completely surrounded the camp and we could hear the clattering of tusks and grunting and foraging very close by.

The weather drew in as we set out in the boat for the macaw colpa, and as the rain clouds gathered the thunder grew louder, and 13 (!) Black Vultures soared over our heads. As the heavens opened we reached the hide and scrambled up the muddy bank to help the morning shift down with the equipment, and headed back with no chance of seeing macaws again today.

Everyone has taken the opportunity to chill out for the rest of the day, but hopefully the weather will improve tomorrow.

Thursday 30th May

Started out for the mammal colpa at 06:00 with the sun just breaking through a haze of cloud, and mist covering the tops of the tree canopy.

Found a new species of squirrel to add to our sightings list, a small nippy fellow which may well be a Bolivian Squirrel believe it or not.

Saddle-backed Tamarins lined the trail, their small dark faces looking at us inquisitively, till they lost their bottle and turned to hurl themselves at the nearest tree to escape.

A Red Brocket Deer visited the colpa to feed; this was a lovely sight as it is such a graceful animal and golden red in the sunshine.

Whilst watching this activity several hundred ants, obviously sensing an affinity with my army boots, had begun marching single-file down my strung-up laces and into the bottoms. Thus giving me much grief when I came to put them on again at the end of the shift.

On the way back we found Spider Monkeys in some emergent trees close to the trail, one carrying young as it lolloped from branch to branch. They give you such an impassive look as they leave their lofty perches, you feel you should apologise for disturbing their gathering.

Friday 31st May

Had the biggest success so far on the new transect trail with a close view of a baby Squirrel Monkey. It reminded me of the old Sindbad movies, minus the ridiculous waistcoat and bells of course.

There was English drizzle all morning and we had to strain to see anything beneath the canopy. That was my excuse anyway when I narrowly missed treading on a Tayra - a large member of the weasel family - that luckily Bob spotted before I flattened it. Brown Capuchin Monkeys came to the edge of camp on our return and tightrope walked between the palm trees.

With one more day left before returning to Puerto, everyone is getting their last chances in of seeing the wildlife and trying to fill in the gaps in their spotting lists.

I am still amazed by the diversity of mammals and birds we have seen in such a short space of time, and hope that everyone has lasting memories of everything we have achieved here.

Saturday 1st June

Last day for the first team and it is really sad to see everyone go. We completed morning shifts and spent the afternoon packing up. The overnight team came back with Kathleen reporting strange sounds at the mammal colpa. We identified the noises as a Greater Snuffling Bob and a Lesser Snoring Steve. New species for the list.

White-fronted Capuchins were along the transect, I really hope to see these soon, as well as the Red Howlers.

It poured down in the afternoon, a bummer for those trying to do some last minute washing.

I think we may be in for another interesting boat journey tomorrow.

Sunday 2nd May

Our boat journey was interesting, but not because of the weather. As we came closer to the Madre de Dios river and to Puerto itself, we were treated to a sight of 10-12 White-lipped Peccaries all swimming their way across to the other bank. They were of all different sizes, with one very small piglet struggling to keep up at the back. The scene turned decidedly sinister though as they neared the shore and a boat of woodcutters heading upriver came over to where the peccaries were heading, wielding their machetes! Maria pulled the youngest piglet up into the boat for safety, as we were witness to a rather gruesome end to one of the wild-pigs.

Despite the obvious distress, I was glad that the team had been there to get some perspective on the relationship between people and wildlife in this area. Only one animal was killed, it had lead a much better life than the majority of animals ending up on western dinner plates, and it was going to feed a family of relatively poor people.

Arriving back at Puerto it felt strange to think that everyone was now going their separate ways. Pretty soon we met up with several of the new team members who had already arrived, and the first group set about telling them all their "colourful" tales of insect bites, machete hacking and peccary massacres!

We all had a final dinner together and then braved the lively "Anaconda Bar" for a well deserved night of letting our newly clean hair down.

Monday 3rd May

Assembled everyone for the first day of the new team's period, minus Matthias who flew back to England in the morning.

As I looked on our fresh-faced new team members, it occurred to me we should take before and after expedition pictures, to assess the physical transformations that take place in just two weeks of jungle life! Some washing powder company could make a fortunate if they could return our whites to their former splendour.

We spent the day in Puerto, getting to know each other, running through the pre-expedition briefings and risk assessments and performing last minute errands before heading back on the river the next day.

I am having withdrawal symptoms from going more than a day without Lucio's delicious banana and yucca chips, must add these snacks to my culinary skills when back in Blighty.

Tuesday 4th May

Back on the water and to start with the weather is fine and the breeze a godsend. We take a 20 minute break at a small village and get the chance to see and hear a tame Saddle-backed Tamarin right up close. Too close in actual fact as it decides to jump on my head whilst I try to photograph it, and begins nit-picking my hair, worrying.

Not long after the heavens open and the team get their first experiences of rainforest weather changes.

Sharon does well to spot a Capybara on the banks as the river has risen much and there is little space for them to come down. We do well again to see White and Black caiman, but the monkeys are being elusive, so we content ourselves with the mischievous Tamarin at the village.

As we arrive at base and drag all our gear up the steep muddy hill, our weary crew gets their first views of the lodge, and all seem pleased and excited despite their tiredness.

Tomorrow will be their first taster of macheteing, and so I hope they sleep well before the chorus of Howler Monkeys starts at 05:15!

Wednesday 5th May

Our flare/firework demo of the night before seems to have silenced the howlers for the time being and everyone has slept pretty well.

The weather has cleared and it is hot and dry. Emma has a new friend in a tree frog, which is making itself at home, on her neck.

In the morning the team have their machete initiation and see Spider and Dusky Titi Monkeys along the way.

In the afternoon we have Chestnut-fronted Macaws to entertain us in the Wasai tree next to the bathrooms. They are smaller than the other prominent species, the Red and Green and the Scarlet, and have not a scrap of chestnut on them. We decide at dinner that the easiest way to identify a species of macaw is to pick the colour that it is least visible, and you're usually correct. We also consider renaming some individuals after celebrities such as Davina Macaw (TV presenter) and Kirsty Macaw (the late Irish Singer), very silly.

Thursday 6th May

Back to the old routine, breakfast at 05:15 and off to the Mammal colpa.

Things began slowly with nothing showing on the trail for the first hour, but then we struck gold. Far off the track I could see branches moving and took up my bins in time to see a large grey/black mass of scraggy fur and an enormous heavy tail, lolloping across a tree. I instantly remembered Emma's description of the elusive Monks' Saki Monkey, which she has suspected of being in the area, but never confirmed a sighting. By this time I was really excited at the thought of finding a new species for Piedras, and kept my fingers-crossed for a better look. No soon thought, we had quietly moved further up the track only to find that the Saki was coming back, and it had brought friends! This time there was no doubt as five of the monkeys crossed above our heads, and even stopped briefly to look down anxiously at us, before hurrying away.

Alike no other species we had seen before, these Sakis have chunky bodies and strange hair atop their crowns which look like badly made wigs brushed forwards. I practically skipped the rest of the way to the colpa hide along with Caroline and James, who had just finished their toilet break in time to view the hairy beasts.

The latter part of the morning was also rewarding and brought new scenes, Scarlet Macaws behaving as if to come down at the mammal colpa which we have not witnessed before, 30 or more above the hide and slowly coming in, only to be spooked by a nervous comrade.

Spider Monkeys also came the closest yet to making an entrance at the colpa, gradually nearing in ever decreasing circles, one with young, but they didn't quite make it.

One Collared Peccary mosied past, and the squirrels were active as usual. On the way home for lunch it was practically raining primates with nine Tamarins, five more Spiders, Brown and my first White-fronted Capuchin too!

Got back to find the machete group collapsed in the hammocks with steam coming off their foreheads. A siesta for all is in store.

Alice, James and Caroline find a medium size snake on the path in the late afternoon, which may turn out to be a rainbow boa. And Emma had views of Blue and Yellow Macaws feeding too.

All in all, another spectacular start for our expedition team, and I'm still buzzing from my Saki sighting.

Friday 7th June

Scorchio! Today the weather has really hotted up and I am glad to be spending the morning at the macaw colpa and not with the machete team!

Sadly there was little activity from the macaws despite the sunshine, which is normally conducive. We concluded that the high degree of peke-peke traffic up and down the river, combined with the low number of individuals and frequent cloud was to blame, and so we headed home for lunch.

Got back to camp to find the impossible had happened, England had beaten Argentina 1-0! Poor Will had stayed behind to listen to the game – in Portuguese - with Lucio translating the score in a rather imaginative manner i.e. complete fabrication.

Had my comeuppance when a plate of fried grubs was produced for lunch, after I had said the night before that I fancied trying some. Having just completed a 6½ hour shift, I was ready to eat anything and they tasted particularly good anyway, almost like soggy peanuts. Some of the braver members of the team had a go too without ill effect, yet.

We had another new sighting in the afternoon, two Brown-mandibled Aracaris, a kind of toucanet, with red and green and yellow colouring, which was very striking.

I now have the pleasure of accompanying Peter and Lisa and James on the night shift at the mammal colpa this evening, so it's early dinner and off into the dark jungle.

Saturday 8th June

Caught the red eye-shine in my torchlight of a Paca, a medium-sized rodent, on the way to the colpa hide. That was as exciting as it got all night for the most of us, other than Peter who glimpsed the yellow eye-shine of a cat within the colpa, obscured from view by foliage.

Relieving the team before us, we found they had seen twelve Coatis crossing the trail on the way there. I was really jealous, as I would love to see these comical raccoon-like creatures, with their high-held banded tails and long snouts.

The weather is holding and it is hot and dry each day at the moment. Lawrence, Caroline and JJ had an unexpected treat at the macaw colpa with Red Howlers secretly climbing down the lianas to feed on the clay cliff, a first and no mistake.

We seem to be getting topsy-turvy data at the moment with Razor-billed Curassows and Violaceous Quail-doves frequenting the mammal-feeding site, and monkeys coming along to the bird clay-lick. I think the wildlife here is having a snigger at our expense and wonder what bizarre new sights we will encounter next.

Later in the day I head out with Emma and Caroline for a second stint at the mammal hide and come across my first Red Howler along the way, I'm not disappointed. Caught in the sunlight its fur is a glowing amber colour and its size and stature impressive.

Both our journeys to and from the colpa are exciting with a close encounter with a herd of White-lipped Peccaries on the way in, one short-sighted boar heading straight for us, heckles raised. And on the way back after dark, we find that we are following a Puma down the path, 20m in front of us!

Sunday 9th June

Our candle-lit breakfast took on a spooky air as JJ told us about the Forest Spirit - the Tunchi - which he had heard in the night, calling to him! With one deer's foot and the ability to shape-change, we were all a little tentative to venture out before sunrise in case we had upset it in any way.

We had a slow start at the macaw colpa with a thick, eerie mist taking a long time to clear, preventing the parrots from coming down. Nonetheless we had nice views of the beautifully coloured Blue-headed Parrot, Dusky-headed Parrots, and a first for me, White-bellied Parrots which have striking orange and yellow heads.

We are by now quite concerned that the macaws have not come down to feed, and have not gathered in large numbers at the colpa since the new group's arrival. Did something happen to disturb them whilst we were away; had someone had a shot at them, are they using another colpa downstream, have the peke-pekes taken their toll, or is it our presence? A mystery we hope to solve soon.

In the afternoon we had an almighty downpour and Emma, Alice and Peter returned from their shifts looking like drowned Agoutis, a medium-sized rodent like a giant Guinea Pig.

Peter had his last day with us, as he heads back to Puerto in the morning, and it is really sad to see him go.

Monday 10th June

After the recent rain, the trails are a lot muddier, as is the mammal colpa. Although we may not appreciate this, one visitor certainly does, a Collared Peccary who comes to wallow in the ooze for several minutes before happily trotting off again.

We see Squirrel Monkeys on the way, who have been quiet recently.

Emma, JJ and James trek the 4.5 km of the extended density transect, and arrive back as we do - drenched again.

The afternoon brightens up but we save our energy for tomorrow when we will again try out the density transect and also check out the colpa downstream for macaw activity.

Four Blue and Yellow Macaws fly over the camp, so at least I now know that they exist!

The garden here is gradually covering the bare ground and bringing colour to the camp surroundings. The papaya plants are doing the best and the floor is being carpeted with the green and yellow of the Manifoaherro plant, like a large shamrock.

Tuesday 11th June

Yesterday afternoon Pedro, one of the staff, did not return for lunch and as evening approached we became more and more concerned that he had followed the wrong trail back from the farm, where he had been harvesting some bananas for our dinner. Just as we were assembling a search team to shout out for him along the trails, Pedro thankfully appeared, looking mightily relieved.

He had indeed taken the wrong path and had eventually come out of the forest at a waterfall much further downstream. He'd then legged it back to camp before nightfall and, as it turned out, torrential rain and wind.

In total he had covered around 25 km, but had no idea where he had been. One consolation, for us at least, was that he'd seen a Giant Anteater with a baby on its back, confirming that they definitely inhabit this area. I think that Pedro would still have rather been home 4 hours earlier than have found another species for Las Piedras!

The rain remained heavy till 23:00, and by morning the walkway of planks down by the port had turned into a floating gangway. We attempted transects and colpa studies but were beaten by yet another extremely heavy downpour, and had to admit defeat for the time being.

During a dry spell, JJ took Lawrence and James to check on the alternative colpa downstream, but there was no activity there. On reaching our usual study site, they were surprised to find that the macaws had returned and in larger numbers than we had seen for sometime. They seemed anxious to feed but were disrupted by the peke-pekes.

Speaking to the owner of the nearby farm concession, he suggested that a section of cliff had fallen into the river and had spooked the macaws thus affecting their feeding habits.

This afternoon, if the weather remains bright, we shall see if they are returning to their normal pattern of events. When we arrived we were pleased to find that around 40 Red and Green Macaws were awaiting us, but maddeningly they all left 10 minutes after we sat down, and did not regroup substantially before the rain set in yet again. I am worried that we interrupted them this time, despite the delay in their reaction, though it could of course be due to the highly changeable weather.

We spent the rest of the afternoon playing games, and are aiming for a round of "Guess-what-kind-of-monkey-I-am" this evening, oh dear.

Wednesday 12th June

A gloriously sunny day and we reaped the rewards. The density transect had White-lipped Peccaries crossing metres in front of Sharon, Lisa and Emma, as well as superb views of Red Howlers, Spider and Capuchin Monkeys.

The quagmire on the mammal colpa trail had lessened a little and we managed to keep up with a large troop of capuchins, including one very young monkey on its parent's back, and one White-fronted variety amongst the Browns.

On reaching the hide we found JJ and Lawrence had had a quiet night, but had seen a family of Razor-billed Curassows in the morning, huge birds with impressive red bills and a metallic sheen to their black feathers, often hunted for their meat.

Our shift was non-productive, and so we headed back a little early, only to discover that a peculiar noise was following us down the path. I racked my brain trying to recognize it - peccaries, no, howlers, no, a bird, surely not. Just then Alice and I caught a glimpse of something 30 metres away, obscured by a large tree trunk, but visibly at least 5 foot off the ground. "Expletive", said Alice, "Gulp", said I. Then a large amount of giggling could be heard as the transect posse emerged from behind the tree. Oh, how we laughed. Not.

When the macaw shift came back for lunch there was much rejoicing. They had seen 30 come down to feed as well as several species of parrot including White-eyed Parakeets and Orange-cheeked Parrots, which we had not even seen in the area till now. Fantastic news, which put all our speculations to rest. With little boat traffic and ideal weather conditions, the birds had returned to the colpa at last!

Thursday 13th June

Even now, it feels a little strange to be sitting at a computer in the middle of the jungle, with all kinds of beetles, moths and flying insects attracted to my screen, and the distant rumble of Howler Monkeys replacing the hum of traffic which is the usual accompaniment to my typing.

With an overcast sky and drizzle in the morning, plus a distinctly cooler breeze, today had more in common with life in England than normal. Though watching Emma and JJ do some "gardening" around the lodge, weeding takes on a whole new meaning with machetes.

Although the rain held off we had little activity all round today. I did manage to see a Plum-throated Cotinga at the macaw colpa, which was dazzlingly turquoise blue even against the dull sky.

We also had a comical display from five Cuvier's toucans that hopped and bounced around some sleepy Red and Green Macaws in a small treetop above the colpa, making a real nuisance of themselves yelping and squealing in a totally barmy manner.

We had a huge catfish caught for us today, which is being turned into cerviche by Lucio for our dinner. I have been keen to try this dish for sometime so I am eagerly awaiting dinnertime even more so than usual.

Friday 14th June

Again rain and cloud but some activity nonetheless. On our way to the mammal colpa we had another close peccary incident which made Lisa and I jump out of our skin as we bent down for a better look, only to find a White-lipped Peccary feet away and looking straight at us. Who was more alarmed is hard to tell but Lisa did an excellent impression of a tamarin launching itself at a tree trunk!

Spider Monkeys were very active on both transect trails, and lower in the canopy than usual because of the bad weather. I will really miss seeing these wonderful creatures and their graceful movements.

Even the macaw colpa had some action, with Blue-headed Parrots braving the conditions to feed in small numbers.

As the afternoon set in, the temperature plummeted, until we were shivering at 17.6 degrees. This may not sound perishing, but dropping sharply from mid-thirties you really feel the difference, and with the wind getting up we were piling on the layers till we all looked 10 kg heavier.

Saturday 15th June

Overnight the lowest temperature had reached 14 degrees and at breakfast at 05:30 it was still pretty nippy.

As the rain was holding off, the teams braved the bad weather, but with little reward unfortunately. Lots of teas and coffees kept spirits up as well as a few star-jumps, and by the afternoon we were back up to near 20 degrees and with glorious sunshine!

Having a last afternoon outing I was really pleased to see Dusky Titi Monkeys very close by in a large palm. They had eluded me all this time and to see them on my last trip into the jungle was a brilliant end to a wonderful experience.

Tomorrow we get on the boat at 08:00 and say goodbye to Las Piedras for a final time.

I never imagined I would encounter so much in such a short period of time here, and I am sure that in a few weeks time it will all seem like a brilliant but unbelievable dream.