Development of novel genetic techniques for conservation studies of large macaws

Field report by *George Olah*

1. Piedras River

Date: 25 November – 04 December 2010

Area: Rio Piedras, Rio Pariamanu (NW from Puerto Maldonado)

Map of the Rio Piedras with the monitored section (red) and the places where samples were collected

River system monitored: 425 km

Feather samples collected: ~130

During the first fieldtrip of this season – and the first trip of our new boat the Pionus that we bought at the beginning of the season – we went to the Piedras River (N-NW from Puerto Maldonado) for a 10-day fieldtrip. The boat driver was Andres Vera, who has worked several times in the Rio Piedras, has family there, friends and local knowledge of this area. My assistant was Crissel Vargas, the coordinator of the Tambopata Macaw Project in Puerto Maldonado, who has also visited the area before.

The new bridge of the Inter-oceanic Highway

The team in the new boat

In the first part of the trip we made a detour to the Rio Pariamanu, and following the description of the local people we found a clay-lick with great activity of large macaws. Following upriver on the Rio Piedras we checked the clay-lick coordinates recorded by Dr. Donald Brightsmith and Gabriela Vigo in 2007 (Clay-lick mapping project of the Tambopata Macaw Project), focusing on the ones where they described large macaws' activity. We successfully sampled 3 of these clay-licks (CP06, CP07, CP09). We also sampled a clay-lick (C05) that hasn't been described before (higher on the river).

Red-and-green macaws at the clay-lick CP06

Collecting feather samples

During our trip we visited several local houses along the river (friends of Andres Vera), and explained them our research objectives and needs of feather samples from macaws. From 4 of these houses the local people donated macaw feathers for the project. Unfortunately most of these feathers belonged to macaws that they shot before we arrived.

We also visited 3 tourist lodges along the river (Tipishca Lodge, Las Piedras Biodiversity Station, Soledad Lodge), where they kindly provided accommodation for us. These lodges are situated near to clay-licks but only Las Piedras Biodiversity Station had a clay-lick (CP06) with good activity and plenty of feather samples.

Soledad Lodge

Good quality feather over the clay-lick CP06

3 native communities (Tipishca, Puerto Nuevo, Monte Salvado) are situated along the river and we contacted all of them (again, Andres knew the communities from long ago). All of the communities belong to the Yine ethnic group, very nice people, they welcomed us with bowls of masato drink (fermented manioc root) that needs to be consumed, otherwise they offend. We did it and also established a very good relationship with them. I explained my research and the importance of conserving these species. In Monte Salvado (the furthest community) I even gave a presentation on my laptop, and they were very interested and wanted to get involved in the investigation, they also donated lots of macaw feathers. I left dry boxes with envelopes for Tipishca and Monte Salvado native communities. They promised to keep collecting feathers for us at the clay-licks and in the forest, and save it in labelled envelopes in the dry boxes.

The leader of the Tipishca Native Community

Drinking masato with Cobalt-winged parakeets

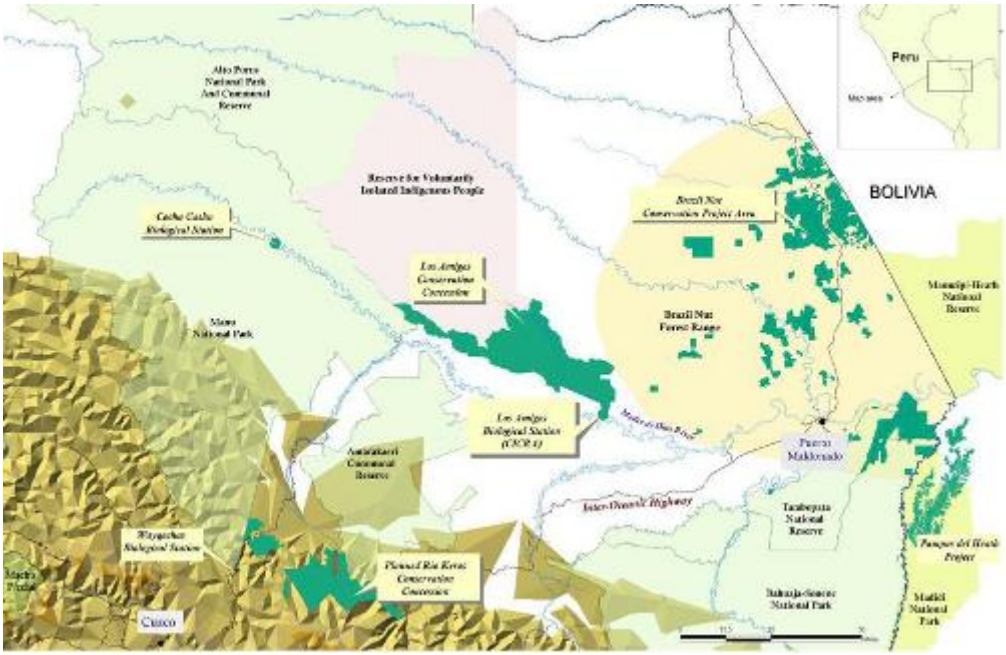
After Monte Salvado we wanted to go up until the line 343 (named after its UTM coordinate), that is the border of the Reserve for Voluntarily Isolated Indigenous People, and the Monte Salvado Community is the guardian of this entrance. They advised us not to go further the clay-lick near to the community, because a week ago they still observed temporary houses of the non-contacted people. This part of the year they come out of the reserve for hunting turtles. We accepted their advice and didn't go further than the mentioned clay-lick. The following photos belong to the community of Monte Salvado.

Temporary shelters

"Backpack" made of palm leaf

An antique photo of the un-contacted people

As for the large macaws we mainly observed Red-and-green Macaw (*Ara chlorpterus* - RGMA) and Blue-and-yellow Macaw (*Ara ararauna* - BYMA) in the area and at the clay licks, so we have samples from these species. We saw Scarlet Macaws (*Ara macao* - SCMA) only once near to Monte Salvado at a lake. During the trip we recorded 2 nests of RGMA, 1 nest of BYMA, 1 nest of Red-bellied Macaw (*Ara manilata*), and 1 possible nest of SCMA (as we were told by the leader of Monte Salvado).



Map of Madre de Dios Region

2. Tambopata River, Candamo Basin

Date: 19 December 2010 – 03 January 2011

Area: Rio Tambopata, Rio Tavara, Rio Candamo (S/SW from Puerto Maldonado)

River system monitored: 236 km

Feather samples collected: 89 (9 RGMA, 24 SCMA, 4 BYMA, 52 other macaws and parrots)

Blood samples from chicks: 15 (3 RGMA, 12 SCMA)

After the first fieldtrip I identified the feather samples collected during the Rio Piedras trip with the help of Lizzie Ortiz (the vet of the Tambopata Macaw Project), from the 178 total samples we had 75 RGMA, 28 SCMA, and 33 BYMA.

In the second fieldtrip we went to the Tambopata/Candamo region for a 16-day trip. The boat driver was Andres Vera, as for the first trip. My assistant was Braulio Poje from the native community of Infierno, who I worked with in the first field season last year.

The first part of the trip (Puerto Maldonado - TRC) with the sites where feather samples were collected

In the first part of the trip we went upriver on the Tambopata for 2 days until we reached the Tambopata Research Center (TRC). On the way we stayed 2 nights in the two other lodges of the Rainforest Expeditions: Posada Amazonas and Refugio Amazonas, while collecting samples from the nearby clay-licks. Our sampling sites in this section included: Posada Amazonas clay-lick (1 feather), El Gato clay-lick (2 RGMA, 3 SCMA feathers), Explorers Inn clay-lick (2 RGMA, 2 SCMA feathers), Chuncho clay-lick (1 RGMA, 1 SCMA feathers), TRC clay-lick (3 RGMA, 11 SCMA feathers). We also found other small macaw and parrot feathers at the sites.

Collecting feathers at El Gato clay-lick

Identifying feathers with Gaby in TRC

We stayed a few days in TRC to help climbing nests for the Tambopata Macaw Project and also to get our own samples from the chicks. According to the project's protocol only chicks older than 18 days can be sampled. So far we have 3 RGMA and 12 SCMA blood samples from the chicks. With Gaby Vigo we identified 179 feather samples collected from the TRC clay-lick in the previous years, but only 1 RGMA, 7 SCMA, and 17 BYMA feathers were found.

Braulio is being attacked by a nesting macaw

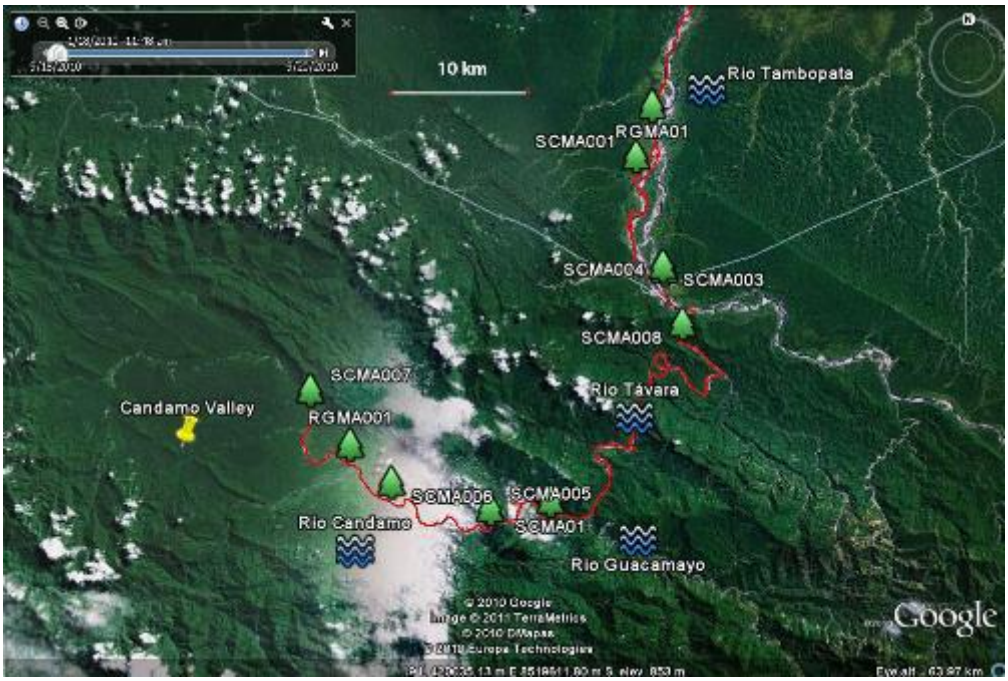
SCMA chicks from a nest in TRC

After Christmas we left TRC to continue with the second part of the trip where we tried to get into the Candamo Basin. Don Brightsmith also joined us for this fieldtrip. Last year in March, 2010 we couldn't get into the basin due to the low water level in the Candamo River. As in this season we tried to get in earlier, when water level is generally higher due to the high rainfall, we succeeded this time and got into the Candamo Basin.

Don, going upriver in the Rio Tavara

Inside the Candamo Basin

During this second part of the trip we found 8 SCMA and 2 RGMA active nests, among these 4 SCMA and 1 RGMA nests in the Candamo Basin.



The distribution of the active macaw nests found during the second part of the trip (TRC - Candamo Basin)

Our original plan was to go upriver Candamo as far as possible and to stop at the nests and clay-licks as we were coming back to TRC. Unfortunately on the second day we had an accident in the middle of the basin where the tail of the engine crashed to a big rock below the water and a part of the tail broke inside so the engine stopped working. As the accident happened near to a SCMA nest (SCMA007), we slingshot and climbed the tree and took blood sample from the only chick found in the nest. We also found feathers possibly from the parents from and below the nest. These remained the only samples we got from Candamo as it was really hard to stop at any part of the river while paddling, so we decided to go back to TRC as soon as possible.

The SCMA007 nest in the Candamo Basin

The only chick in the nest

Coming back from Candamo took us 2 and half days downriver. We spent New Years in the research center celebrating the access to Candamo. In TRC we put my small peke boat engine on the boat and went back to Puerto Maldonado for the reparation of the Mercury engine.

Paddling downriver from Candamo

Stuck half way in the Rio Tavara

3. Tambopata River, Candamo Basin

Date: 09 January – 07 February 2011

Area: Rio Tambopata, Rio Tavara, Rio Candamo (S/SW from Puerto Maldonado)

Map of the Rio Tambopata/Candamo with the monitored section (red)

River system monitored: 300 km

Feather samples collected: 414 (90 RGMA, 221 SCMA, 13 BYMA, 90 other macaws and parrots)

Blood samples from chicks: 15 (6 RGMA, 9 SCMA)

Blood samples from adults: 10 (2 RGMA, 8 SCMA)

During the week I spent in Puerto Maldonado (03-08 January), the boat and the engine were repaired and ready for the next trip to the Tambopata/Candamo region. This time I only took one person, Braulio, as boat driver and assistant, as most of the time we spent in TRC and around. The trip took a whole month with several small fieldtrips, using TRC for the base.

1.) Puerto Maldonado – TRC (09-11 January)

During these days we re-sampled the clay-licks in the Tambopata River between Puerto Maldonado and TRC. We found the following amount of Red-and-green and Scarlet Macaw feathers:

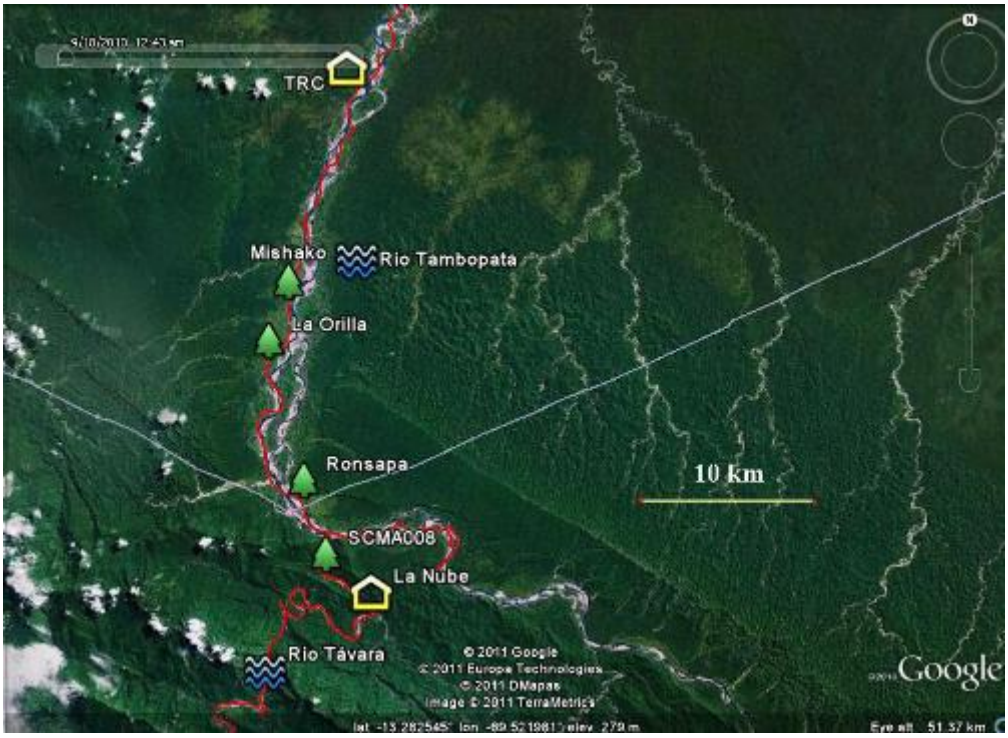
Place	No of total feathers	RGMA	SCMA
Collpa Explorers Inn	19	3	7
Collpa El Gato	27	3	8
SCMA Nest 1 (Baltimore)	3		3
Collpa Chuncho	47	19	19
TRC - Collpa Colorado	11		
TRC - Collpa Banca 2	32	12	12

2.) TRC – La Nube (The Cloud) Research Station (14-15 January)

We went upriver Tambopata all the way to the Rio Tavara to slingshot and climb the nests we found in this section with Don in December but weren't able to climb that time because of the engine failure. We climbed and checked 4 nests with the following results:

Nest Name	Species	River	Tavara (14-15 Jan)
Mishako	RGMA	Tambopata	2 chicks, feathers
La Orilla	SCMA	Tambopata	2 eggs, feathers
Ronsapa	SCMA	Tambopata	2 chicks
SCMA 008		Tavara	water in the cavity

I marked with green when we obtained blood samples from the chicks and yellow when only feather samples were gained. I think feather samples from nests are more important in this study and those feathers contain genetic materials from the adults (the chicks haven't had feathers yet), whose feathers can be found at other clay-licks in the region. We spent a night in the abandoned La Nube Research Station.



Map of the TRC – La Nube section of Tambopata/Tavara with the nests climbed

3.) Aguajal 18 Palm swamp (17-20 January)

We went to a nearby palm swamp (18 km upriver Tambopata from TRC) for a few days to catch Blue-and-yellow Macaws for Don's satellite telemetry project. 5 of us went to this trip, Braulio, Don, me, and 2 volunteers from TRC, and camped near to the palm swamp in the forest. We first found and observed the active nests, how the adults are moving in and out, and then we slingshot two lines for mist net that we pulled up in the front of the most used entrance on the palm tree. Unfortunately we didn't catch any BYMA but it was a great trip working in a palm swamp environment.

Setting up the mist net in the palm swamp

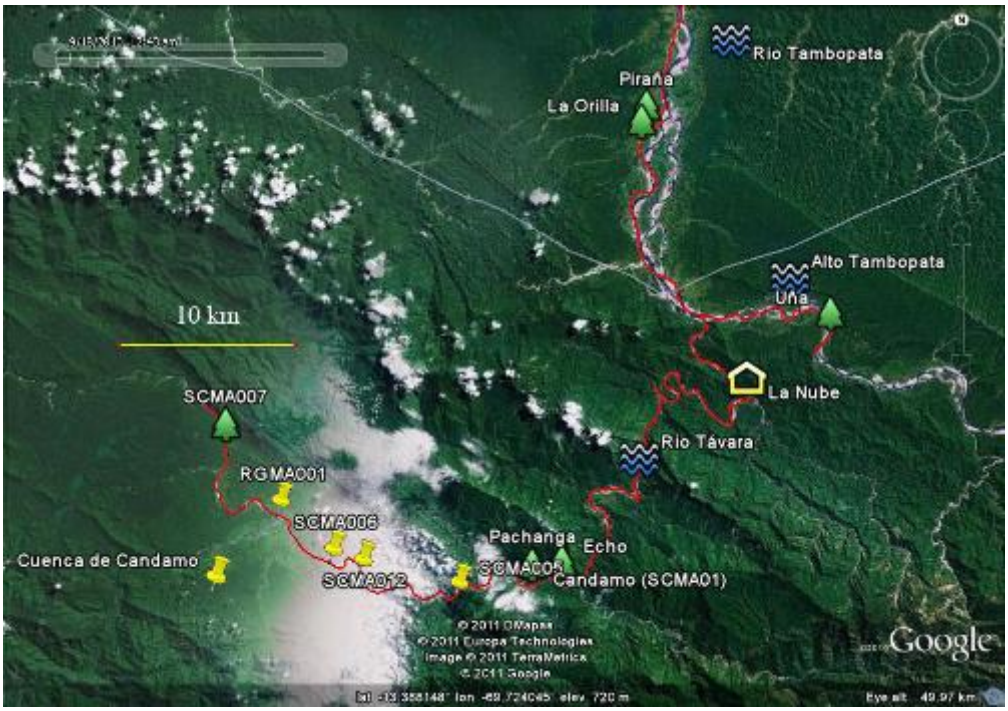
Mist net pulled up in the front of the nest

4.) Candamo (27-31 January)

At the end of the month we made our way back to Candamo with the repaired boat engine. 4 of us went for this trip: Braulio, me, Pachanga (a staff member from TRC), and Jill (a veterinarian from TAMU). We managed to go only 3 km further inside the basin than last time, where we couldn't continue the trip, not even with a peke-peke engine, because of the low water level. So we decided to turn back and start slingshot and climb the nests we discovered last time. We also discovered 2 new nests in the basin, and 2 in the other rivers. We collected the following samples:

Nest Name	Species	River	Candamo 2 (27-31 Jan)
Piraña (New)	RGMA	Tambopata	2 chicks, feathers
La Orilla	SCMA	Tambopata	tree fall into river
Echo (New)	SCMA	Candamo	2 eggs, feathers
Pachanga (New)	SCMA	Candamo	2 eggs, feathers
Candamo	SCMA	Candamo	1 chick, feathers
SCMA 005	SCMA	Candamo	wasps, 1 feather below the nest
SCMA 012		Candamo	water in the cavity
SCMA 006	SCMA	Candamo	dead tree
RGMA 001	RGMA	Candamo	tree fall into river
SCMA 007	SCMA	Candamo	feathers
Uña (New)	SCMA	Alto Tambopata	2 chicks, feathers

I marked with green when we obtained blood samples from the chick(s), yellow when only feather samples were gained, and red when a previously sampled/discovered nest ceased to exist. We also checked a part (10 km) of the Alto Tambopata, where we found a new SCMA nest, Uña.



Map of the Candamo trip with the nests

Tapir in Candamo

A sticky stick invention to take out feathers from nests that hard to access

5.) TRC and around

Between the fieldtrips we used TRC as a base and also got lots of work done here. We slingshot and climbed a natural SCMA nest, Blady, in front of TRC the other side of the river. We slingshot another SCMA nest near TRC, named Isula, that had eggs and feathers inside. In TRC we sampled 8 chicks (blood samples). First time in the project's history, with Don we designed and constructed traps for 5 artificial nests to trap adults inside. Samples from adults have really high priority for my study as I might find feathers from the same individual at the

nearby clay-licks. This trapping system had a great success as we caught all the adults we wanted at the following nests:

Nest Name	Type	Species	1st chick	2nd chick	3rd chick	Adult Male	Adult Female
Franz	Wooden	SCMA	15/12/2010			26/01/2011	24/12/2010
Hugo	Wooden	SCMA	20/12/2010	20/12/2010	20/10/2010	Tabasco	22/01/2011
Invisible	PVC	SCMA	24/12/2010	24/12/2010		03/02/2011	24/01/2011
Angeles	Wooden	SCMA	02/01/2011			24/01/2011	21/01/2011
PVC	PVC	RGMA	24/12/2010	18/01/2011		02/02/2011	23/01/2011

The dates represent the day when the individual was sampled. For 2 SCMA males (marked with blue) satellite collars were also deployed for Don's project. It wasn't always easy to grab the adults inside their nest, but my wounds are regenerating for now.

Trap open

Trap closed

6.) TRC – Puerto Maldonado (06-08 February)

Going downriver to Puerto Maldonado we made the third recollection of feathers at the Tambopata clay-licks (the core region of the project). We found the following amount of feathers:

Place	No of feathers	RGMA	SCMA
TRC - Collpa Banca 2	6	1	4
TRC - Collpa Colorado	12		1
Collpa Chuncho	3	3	
Nest POOH	38		38
Nest Baltimore	11	1	11
Collpa El Gato	2	5	
Collpa Explorers Inn	22	7	17
Collpa Posada Amazonas	18		5

We also checked 3 nests downriver. Isula, a SCMA nest that we climbed early January fall into the river. POOH only had eggs and lots of feathers. Baltimore is a new nest in a private land where we got the permission (after paying some tip) to climb it, but only feathers were found, good enough for me.

Name	Species	River	Tambopata 2 (6-8 Feb)
Baltimore	SCMA	Tambopata	feathers from the nest
POOH	SCMA	Tambopata	3 eggs, feathers
Isula	SCMA	Tambopata	tree fall into river

Chestnut-fronted Macaws and Piping guan on the TRC clay-lick

Identifying feathers with Lizzie Ortiz in TRC

4. Heath River

Date: 19 February – 12 March 2011

Area: Rio Piedras, Rio Heath

River system monitored: 107 km in Rio Piedras/Pariamnu, 336 km in Rio Heath

Feather samples collected: 112 (38 RGMA, 60 SCMA, 1 BYMA, 13 other macaws and parrots)

In the second part of February we made two fieldtrips. During the first fieldtrip (21-24 February) we went to Rio Piedras again for a repetition of recollecting feathers. Those days it was raining a lot and delayed our leaving with several days. When we finally were able to leave (with Crissel and Braulio), it started to rain again in the field, so we only got until the Collpa Pariamanu. The rivers were flooded and the clay lick was almost covered by the river, no feathers on the lick. It was such a heavy storm that we decided to cancel that fieldtrip and returned to Puerto Maldonado.

For the second fieldtrip we had more luck when we went to the Rio Heath (first time) between 27 February and 12 March. For this trip Jerico Solis (a visiting researcher of the Tambopata Macaw Project) joined us as field assistant, and Braulio came as boat driver.

Map of the Rio Heath with the monitored section (red) and the points where feathers were collected

The Rio Heath is the bordering river between Peru and Bolivia, to the SE from Puerto Maldonado and the Inter-Oceanic Highway. The habitat is quite different on the Bolivian side as there are pampas bordering the rainforest. On the trip we did not find any macaw nests, or even emergent trees with large holes. In the first part of the Heath River we stayed at a Peruvian owned lodge (Inkanatura). At the clay lick nearby we found several macaw feathers (mainly over the lick where birds were perched). We also found another clay lick further away with 1 macaw feather on it.

Collpa Inkanatura (with Jerico)

Washed away on the beach

From that lodge we continued upriver for 2 more days camping on the beach at night. We arrived all the way to the foothills of the Andes (Puno department) where the river was too shallow to continue. At this section of the river we did not find any more clay licks but we stopped at spots where we observed macaws gathering on trees (maybe foraging) and looked for feathers below them. At 3 of these spots (PH 01, 02, 03) we did find feathers. In the Tariquaya Reintroduction Center on Madre de Dios River we got some feather samples from a SCMA that was captured in this region.

Place	No of feathers	RGMA	SCMA	BYMA
Collpa Inkanatura	67	27	29	
PH01	4		3	1
PH02	1	1		
PH03	7	5	1	
C02	1		1	
Collpa Inkanatura	10	5	4	
Tariquaya - MDD	22		22	

The pampas of Heath in Bolivia

5. Tambopata River, Candamo Basin

Date: 14 March – 07 April 2011

Area: Rio Tambopata

Feather samples collected: 358 (115 RGMA, 125 SCMA, 24 BYMA, 94 other macaws and parrots)

Blood samples collected: 2 SCMA (Candamo Valley)

In the last fieldtrip we returned to the Tambopata/Candamo region. While moving back and forward among the lodges of the Rainforest Expeditions we conducted the last two recollections of feathers at the Tambopata clay-licks. These are the samples from the first recollection:

Place	No of feathers	RGMA	SCMA	BYMA
Collpa Explorers Inn	12		2	
TRC - Collpa Banca 2	15	2	4	1
TRC - Collpa Banca 2	36	5	8	5
TRC - Collpa Colorado	7	1		
Collpa Chuncho	136	60	43	12
Collpa El Gato	24	4	8	
Collpa Explorers Inn	12		6	
Collpa Posada Amazonas	4	2	2	

Next to the new tower of TRC we also pulled up a new wooden nest box and we named it Budapest. Rainforest Expeditions will put some explanation guide on the top of the tower, so tourists can read more about the research and watch how researchers climb the nest.

Map of the Rio Tambopata/Candamo with the monitored section (red)

In the end of March we made a last trip to the Candamo Valley. We collected feathers from the Tavara clay-lick and revisited two nests (Echo and Pachanga) that only had eggs in our last visit. Fortunately we found one chick in each nest this time and took blood samples from them.

Date	Place	No of feathers	RGMA	SCMA	BYMA
15/03/2011	Pachanga Nest - Candamo	5		5	1
16/03/2011	Echo Nest - Candamo	12		12	1
16/03/2011	Collpa Tavara	55	28	26	

SCMA chick in Candamo

Rainbow over the Tambopata River

In April we went back to TRC to make and inventory of all my field gear and save them in the research center. During our last trip from TRC to Puerto Maldonado we made a last resample of the Tambopata clay-licks:

Place	No of feathers	RGMA	SCMA	BYMA
Collpa Posada Amazonas	6	4		
Refugio Amazonas Lodge	1	1		
TRC - Tapir Nest	1		1	
TRC - Collpa Colorado	12	1	1	1
TRC - Collpa Banca 2	5	1	3	
Collpa Chuncho	12	4	3	5
Collpa Explorers Inn	1	1		
Collpa Posada Amazonas	2	1	1	

Abbreviations:

RGMA – Red-and-green Macaw (*Ara chloropterus*)

SCMA – Scarlet Macaw (*Ara macao*)

BYMA – Blue-and-yellow Macaw (*Ara ararauna*)

George Olah
george.olah@anu.edu.au
PhD Scholar
Fenner School of Environment and Society
ANU College of Medicine, Biology & Environment
WK Hancock Building 43
Australian National University
Canberra, ACT 0200 Australia