

# International Primatological Society

# IPS Bulletin



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## President's Corner

[kbstrier@wisc.edu](mailto:kbstrier@wisc.edu)

It is a pleasure to be writing once again after having recently returned from a brief visit to my field site in southeastern Brazil. There, a new team of Brazilian students—coincidentally, all women—began their training in preparation of taking over the demographic monitoring for what is now the 37<sup>th</sup> year of the Muriqui Project of Caratinga. These murequis have distinct facial pigmentation patterns and facial features that enable us to identify individuals from their natural markings, but it still takes 6-8 weeks of concentrated effort for each new team to learn how to recognize the more than 250 murequis in our study population today. During the past year, the last surviving adults from my original study group died, with the oldest female estimated to have been at least 43 years old at last sighting. However, one result of the continuity in our monitoring is we know that some of the offspring, grand-offspring, and even great-grand-offspring of those original study subjects are still alive. And, thanks to these murequi survivors we are still learning about the dynamic social, ecological, and demographic processes that are shaping their behavior and contributing to the population's persistence over time.

The IPS has also been engaged in a range of dynamic processes. Indeed, although 2019 is the odd year between our Congresses, the IPS officers have been as active as ever. Among the most important tasks have been the evaluation of proposals for funding of research, conservation, education, and captive care initiatives. We received some 116 proposals across the different areas, out of which a total of 27 awards were made including one Galante and two Southwick awards. More details on these awards are presented on subsequent pages of this newsletter by the Vice Presidents responsible for chairing their respective review committees. We look forward to hearing from successful awardees in future newsletters, and to funding another set of equally meritorious proposals in the next round.

To ensure continuity in these and other activities, IPS Treasurer and Vice President for Membership, Trudy Turner, has been working diligently with experts on our financial audit, as is required by the IPS Constitution each time the position of Treasurer changes. Trudy has also been following up on other essential details, such as verifying that the tax-exempt status of the IPS is up-to-date, and consulting on the many financial considerations that come up in the preparations for our next IPS Congress, which will be held jointly with the Latin American Society of Primatologists (SLAPrim) in Quito, Ecuador, from 16-22 August 2020.

## IPS Officers

### PRESIDENT

Karen Strier  
University of Wisconsin-Madison  
Dept of Anthropology  
Madison, WI, 53706, USA  
[kbstrier@wisc.edu](mailto:kbstrier@wisc.edu)

### SECRETARY GENERAL

Júlio César Bicca-Marques  
Pontifícia Universidade Católica do  
Rio Grande do Sul  
Escola de Ciências  
Porto Alegre, RS 90619-900, BRAZIL  
[jcbicca@pucrs.br](mailto:jcbicca@pucrs.br)

### TREASURER, VP FOR MEMBERSHIP

Trudy Turner  
Department of Anthropology  
PO Box 413 UW-Milwaukee  
Milwaukee, WI 53201 USA  
[trudy@uwm.edu](mailto:trudy@uwm.edu)

### VP FOR COMMUNICATIONS

Cat Hobaiter  
School of Psychology  
University of St Andrews  
St Mary's College, South Street  
St Andrews, KY16 9JP, SCOTLAND  
[clh42@st-andrews.ac.uk](mailto:clh42@st-andrews.ac.uk)

### VP FOR CONSERVATION

Tatyana Humle  
School of Anthropology &  
Conservation  
University of Kent, UK  
[T.Humle@kent.ac.uk](mailto:T.Humle@kent.ac.uk)

### VP FOR CAPTIVE CARE

Stephen Ross  
Lester E. Fisher Centre  
Lincoln Park Zoo  
Chicago, IL 60614, USA  
[sross@lpzoo.org](mailto:sross@lpzoo.org)

### VP FOR EDUCATION

Patricia Izar  
University of São Paulo  
Dept of Experimental Psychology  
Av. Prof. Mello Moraes 1721  
C. São Paulo, SP, CEP 05508-030,  
BRAZIL  
[patrizar@usp.br](mailto:patrizar@usp.br)

### VP FOR RESEARCH

Marina Cords  
Columbia University  
Department of Ecology, Evolution,  
and Environmental Biology  
1200 Amsterdam Avenue  
New York NY 10027, USA  
[marina.cords@columbia.edu](mailto:marina.cords@columbia.edu)

IPS Website: [www.internationalprimatologicalsociety.org](http://www.internationalprimatologicalsociety.org)

Cat Hobaiter, Editor



Preparations for the Congress are well underway, thanks to the efforts of Local Arrangements Committee Chair, Stella de la Torre. Information about registration deadlines and pre- and post-congress tours will be updated at the Congress website <https://ipsquito.com/>. Vice President for Conservation Tanya Humle has already begun planning the Pre-Congress Training Workshop, and Steve Schapiro, who is chairing the Scientific Committee, has already begun organizing an Executive Committee to develop the scientific components of the program. Be sure to watch for emails and to check the IPS Congress website for news and announcements about the Congress over the coming months.

During the month of July, all IPS members will be contacted by email with a request to vote on our proposed revisions to the IPS Constitution and Bylaws. These revisions, which were unanimously approved by the IPS officers and endorsed by the Council, include the addition of a new position for a Vice President for Ethics, Diversity, Equity and Inclusion, and a new "Outstanding Achievement Award." We also propose text adjusting the role of the immediate past president from being that of non-voting, ex officio member of the Council to non-voting, ex officio Officer. We hope all of you will take the time to review the rationales and to vote on the proposed revisions!

Timing for approval of these revisions is important because over the next six months I will be contacting you in my capacity as Chair of the IPS Awards Committee and the IPS Elections Committee. Please start thinking about which of your most distinguished colleagues you might

want to nominate for the Lifetime Achievement Award and hopefully the proposed new Outstanding Achievement Award. Please also put some thought into nominating colleagues you would like to see stand as candidates in the next round of IPS officer elections, which we hope these next elections will include the new position of Vice President for Ethics, Diversity, Equity and Inclusion. The Awards Committee will be announcing guidelines to standardize the award nominations, so watch for news of these guidelines as well.

I would like to close by reiterating my thanks to all of my IPS Officer colleagues for their time, effort, and creative energy in helping the IPS to do its job. This is the first time in many years that all of us officers are in our first terms, and we have benefited greatly from consultations with our predecessors for help, advice, and information about precedents. In addition to our respective, specified duties, the current IPS Officers also review a steady stream of requests for IPS collaboration or endorsement from members and nonmembers alike. Each request usually involves a series of email exchanges, and each time we take a stance, IPS Vice President for Communications Cat Hobaiter expeditiously posts it under the News heading at the IPS website and on our Facebook page. I am proud to be a participant in this process, and to be able to use the voice of IPS for the benefit of all primates.

With best wishes,

Karen B. Strier  
IPS President

## VP for Communication

[clh42@st-andrews.ac.uk](mailto:clh42@st-andrews.ac.uk)

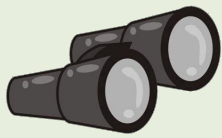
Hello Primate folk, thank you to everyone who has submitted reports and information for inclusion in this edition. As well as updates from our Officers and grantees, we have our next 'Getting To Know your IPS Officers' section. Júlio César Bicca-Marques, our Secretary General, talks to us about his background, a typical day, and what motivates him.

We have the outcomes of our 2019 grant round. If you're interested in applying for the next round in 2020 please remember to take a look at the IPS website for advice on grant writing and examples of previously successful grants. Grant applicants

from primate range countries can apply to receive feedback on their application before the final submission. If you'd like to know more, please get in touch!

For up-to-date happenings stay tuned to our online media for primate news, meetings, the IPS elections, advocacy, and other activities! And please do get in touch with feedback or ideas for what you would like to see IPS do for our fellow primates and primatologists.

Pant hoots! Cat Hobaiter  
[@IPS\\_PrimateNews](https://twitter.com/IPS_PrimateNews)



## Getting to Know Your: Secretary General

**What is your scientific background?** I am graduated in Biology at the Federal University of Rio Grande do Sul/Brazil, MSc in Ecology at the University of Brasília/Brazil and PhD in Anthropology at the University of Illinois at Urbana-Champaign/USA.

**How did you choose your field of study?** I have been fascinated with animals and their behavior, ecology and conservation since my childhood. When I was 10, I created an “Animal Watchers Club” with a handful of classmates. Initially interested in studying freshwater turtles, I became fascinated with nonhuman primates during the middle of my undergraduate studies. The decision to study their behavior and ecology to help improve their conservation was a natural next step.

**What is a typical day like?** To answer this question I first need to mention that I am a Professor at the Pontifical Catholic University of Rio Grande do Sul in Brazil, where I teach at both the graduate and undergraduate levels, conduct research, supervise undergraduate Biology students, and PhD and MSc students in the Graduate Program in Ecology and Evolution of Biodiversity. I also serve as Head of the Office of Undergraduate Research among other duties. In addition to these university responsibilities, I am Secretary General of IPS, Editor, Associate Editor, member of the Editorial Board and *ad-hoc* reviewer for many journals and international and national granting agencies. You can now understand my answer. My typical day involves MANY hours working on the computer, combined with teaching, advising students and attending university meetings.

**What are you working on at the moment that you're really excited about?** This is a hard question to answer because I am always enthusiastic with all of the research projects that I get involved in. My projects have focused principally on the ecology and behavior of

primates in forest fragments, and on social foraging and cognitive ecology. However, I can mention that I am very excited with my recent research integrating data on the use of plants by nonhuman primates, the medicinal properties of those plants, and the impact of infectious diseases on individual health to better understand the precursors of primate self-medication. I am aware that there is much skepticism on the viability of this approach, but... maybe this very disbelief helps to fire my excitement about it.

**What's the hardest part of your job?** There is no doubt in my mind that the hardest part of my job is to fulfill my tasks without missing deadlines, while doing my best in every single case.

**What motivated you to join the IPS Council?** I felt truly honored with my nomination to run for the office of Secretary General of IPS. I see this position as an outstanding opportunity to help promoting the perspective of habitat country primatologists in our society and the society's involvement in conservation. I was prepared for the challenge because I have previously held positions as President of the Brazilian Primatological Society and Director for Research of the Latin American Primatological Society.

**What would you like to see IPS do more of?** I would like to see IPS more involved in the promotion of primate conservation and the empowerment of habitat country primatologists, particularly those from countries that do not provide them with the adequate funding and conditions for seeking excellence in their science and conservation activities.

*Júlio César Bicca-Marques is a Professor at the Pontifical Catholic University of Rio Grande do Sul in Brazil. He has worked all over the Americas and published on topics as diverse as habitat fragmentation, self-medication, and tool-use. He is the co-editor of Neotropical Primates, serves on the IUCN Primate Specialist Group, and has over 20 years experience studying primate behaviour.*

## Secretary General

jcbicca@puers.br

I am pleased to let you know that the registration for our 2020 IPS Congress in Quito, Ecuador, opens November 1<sup>st</sup>, 2019 <https://ipsquito.com/>. I am sure that we will have an outstanding scientific program and that your participation will help us strengthen our field and society. In addition to getting to know this great country and city, you will have the opportunity to visit amazing wilderness areas, such as the Galapagos Islands.

Please keep active in the society's businesses and exercise your rights. The membership will soon be requested to vote on a few, but important, changes in IPS Constitution and Bylaws, including the addition of a new position, the Vice-President for Ethics, Diversity, Equity and Inclusion. After this important new position is approved by the membership, we will have the election of its first officer.

Discuss with in-country colleagues the possibility of placing a bid for the 2024 IPS Congress. We

were contacted and have been working with the first country interested in hosting it. I hope that others will also contact us to prepare a bid. Our site contains the "IPS Guidelines for submitting a Bid for Conferences 2019" under the tab "Policies and Guidelines" to help our members to prepare a strong and competitive bid to host a congress that will be both scientifically stimulating and environmentally responsible. This means that we encourage proponents to think seriously about strategies to mitigate the carbon footprint of our meetings.

Finally, I would like to tell range country societies that I am available to offer a one-week workshop on scientific writing for students and young scholars. Societies interested in holding a workshop for their members can contact me to discuss dates and other logistical details.

Júlio César Bicca-Marques  
Secretary General

## VP for Captive Care

sross@xxx

The Captive Care Committee was pleased to receive 12 excellent applications for this granting cycle. Each proposal was scored by at least 11 committee members, ensuring a thorough review of content, methods and impact and in the end, we were able to recommend funding for four proposals.

- The Primate Care Training Program (Gregg Tully, PASA)
- Vegetation survey and toxic plan management for sanctuary Grauer's gorillas in Eastern Democratic Republic of Congo (Sonya Kahlenberg, GRACE sanctuary)

- Environmental enrichment for capuchin monkeys at Machia Sanctuary in Bolivia (Macer Parton, Comunidad Inti Wara Yassi)
- Understanding nutrition to improve the health and welfare of captive chimpanzees (Nicola Bryson-Morisson, University of Kent)

Congratulations to this year's grantees and we look forward to another excellent group of submissions next round!

Cheers  
Steve Ross, IPS VP for Captive Care and Breeding



# VP for Education

[patrizar@usp.br](mailto:patrizar@usp.br)

Outcome of the 2019 Education Grants Competition

## **Lawrence Jacobsen Education Development Grants:**

This year we had only 8 applications from 5 countries across Africa, South and North America, Asia, and Europe (Indonesia (2 applications), Madagascar (2 applications), Nepal, EUA (2 applications), and UK). In 2019, the Education Committee started to provide feedback on proposals prior to submission from nationals of range-state countries. The only applicant who took this opportunity and received pre-review was one of the awardees. We strongly encourage more applications for the Lawrence Jacobsen grants and the use of the pre-review process in 2020!

I am very grateful to the dedicated IPS members who assisted with the review and judging for the 2019 Lawrence Jacobsen Education Development grants and the Charles Southwick Conservation Education Commitment Award. Acknowledgements are due to: Alejandra Duarte, Carla Castro, Inza Kone, Joana Ferreira da Silva, Laura Marsh, Lynne Miller, Martin Kowalewsky, Mewa Singh, Misato Hayashi, Renata G. Ferreira, Rachel Ikemeh, Simplicious Gessa, Suchinda Malaivijitnond, Thomas Breuer, and Zarin Machanda.

We awarded US\$ 5,980 in three grants (all included Community Conservation Initiatives in their applications):

**Rahayu Oktaviani (Indonesia):**  
Communicating Research Findings into Classroom to Raise Awareness on Endangered Javan Gibbon (*Hylobates moloch*)

**Bishwanath Rijal (Nepal):** Producing a primate field guide to mitigate human-nonhuman primate conflict in Nepal

**Rose Marie Randrianarison (Madagascar/France):** My First Lemur Conservation Book - The Forest of the Dragon Trees

## **Charles Southwick Conservation Education Commitment Award:**

This award is dedicated to recognize the contribution to conservation education of individuals living in primate habitat countries. This year we received two nominations and they were both outstanding!

We thus awarded US\$ 4,000 in two grants this year:

**Jorge Damian Ayala Santacruz,** Educator of Fundación Para La Tierra, Paraguay

**Rose Marie Randrianarison,** Research and Training Manager, and Scientific Advisor of Maromizaha Protected Area, Madagascar

We do encourage primatologists working in primate habitat areas to nominate members of the local community that have made a significant contribution to conservation education.

If any IPS members are interested in serving on the Education Committee, or have specific issues they would like addressed, please contact me at [patrizar@usp.br](mailto:patrizar@usp.br).

Patrícia Izar  
VP for Education

## VP for Research

The main news from the Research Committee concerns the 2019 research grant competition, which finished up in April. I would like to thank the members of this committee for their help in reviewing applications and providing constructive feedback which we shared with applicants. The committee members were: Katherine Amato, Judith Burkart, Fernando Campos, Christini Caselli, Rebecca Chancellor, Óscar M. Chaves, Bert Covert, Anthony DiFiore, Cedric Girard-Buttoz, Maren Huck, Urs Kalbitzer, Amanda Koerstjens, Andres Link, Ikki Matsuda, Amanda Melin, Nga Nguyen, Patrick Onyango, Lilian Cortes Ortiz, Julia Ostner, Onya Razafindratsima, Julie Teichroeb, Yamato Tsuji, Sarie van Belle and Eva Wikberg.

As part of an initiative spearheaded by Jo Setchell, who preceded me as VP for Research, the Research Committee now offers pre-submission feedback on draft proposals from nationals of range countries. We received six such requests this year, and hope for even more next year.

The final competition included 66 proposals from researchers affiliated with institutions in 16 countries (Brazil, Cameroon, Canada, Colombia, Democratic Republic of the Congo, Ethiopia, France, Germany, Indonesia, Malaysia, Mexico, Netherlands, Paraguay, Spain, UK and USA).

We awarded a total of \$16,257 in 11 grants, an increase over previous years. The successful applicants and projects are listed below, along with the country of their affiliation, with an asterisk indicating range country nationals.

- Juliane Damm\* (Mexico): “Do social interactions and social organization modulate the physiological stress response of wild Geoffroy's spider monkeys (*Ateles geoffroyi*)?”

- Allegra Depasquale (Canada): “Are diet and nutrition of wild capuchins influenced by color vision type? A test of the niche divergence hypothesis”
- Philippa Hammond\* (UK): “Remote monitoring of predation pressure and its effects on baboon demographics, ranging patterns and nocturnal behaviours”
- Katherine Kling (USA): “Movement in the matrix: lemur space use and activity across anthropogenic landscapes in southeastern Madagascar”
- Louise Loyant (UK): “Social tolerance and inhibitory control skills in macaque species”
- Meredith Lutz (USA): “Behavioral mechanisms underlying seasonal social plasticity in three sympatric lemur species”
- Lais Moreira\* (Canada): “A multi-modal approach to understanding sexual signaling in spider monkeys (*Ateles geoffroyi*)”
- Corinna Most (USA): “Do differences in the social behavior of wild infant olive baboons (*P. anubis*) persist in the juvenile period?”
- Sylvain Nyandwi\* (USA): “Wild chimpanzee genetic diversity, health and behavior in isolated fragments in Rwanda: population viability in isolated habitats”
- Tom Roth (Netherlands): Investigating cognitive biases for symmetry and sexual dimorphism in zoo-housed Bornean orangutans (*Pongo pygmaeus*)

One of the successful applicants included a Community Conservation Initiative in her application, which was funded incrementally.

If you are interested in the activities of the Research Committee, or if you have specific issues you would like addressed, please contact me.

Marina Cords, VP Research

## Trea\$ury Note\$

Trudy@uwm.edu

Registration for the Quito will begin soon. Remember that IPS members get a special member's rate – why not make sure that your membership dues are paid before registration begins? We now offer a two-year registration option. If you choose this, you will be a member this year when you register and next year when you attend the meetings.

This year has been busy with lots of “behind the scenes” activity—reestablishing our tax-exempt status, arranging for a bylaws-mandated audit, updating our accounts and sending out all the

monies for our grantees. This has all involved a steep learning curve and I am grateful to both Steve Schapiro and Nancy Capitanio for their patience.

In order to ensure that we continue to do the things we want to do—I urge you both to pay your dues and to contribute in any way you can to our funds. None of the activities of the association happen without you.

Trudy Turner  
Treasurer, VP for Membership

## VP for Conservation

T.Humle@kent.ac.uk

IPS Bulletin-Conservation Committee-July 2019  
I would like to thank all the IPS Conservation Committee members for their time and help with this granting cycle and previous grantees for their wonderful reports.

This year, we received a total of 32 excellent applications for our Conservation grants. Each proposal was reviewed thoroughly by three committee members; reviewers provided feedback and a score out of 20 based on a set of established criteria; each application was then ranked based on the mean z-score; we were hence able to recommend funding for six proposals for a total amount of \$10,120. The following were the successful grantees:

- *Field surveys and Environmental Education for Sustainable Protected Area Management for the Yellow Tailed Woolly Monkey and Peruvian Night Monkey* to Sarmiento, Yeissy, Neotropical Primate Conservation (NPC), Peru
- *Status of the Nigeria-Cameroon chimpanzee and others endangered primates and the dynamics of bushmeat hunting in the Ebo forest, Littoral Region, Cameroon* to Kedjuangi, Egbe, University of Buea, Cameroon
- *Behavior and physiological stress of Mexican howler monkeys in four sites with different levels of human interaction: effects of ecotourism and cacao agroecosystems* to Ramos-Lara, Nicolas, Arkansas State University, Campus Querétaro, Mexico
- *How behavioural, physiological and environmental factors affect the likelihood of electrocutions?* to

Santarsieri, Isabella, University of Roehampton, UK (project based in Diani Forest, Kenya)

- *Calling from bed: localization of chimpanzee nests from passive acoustic monitoring* to Crunchant, Anne-Sophie, Liverpool John Moores University, UK (Project based in Issa Valley, Tanzania)

- *Patrol and fire-fighting teams to protect and conserve the Sabangau Forest, home to the world's largest orangutan population* to Sheward, Susan, Orangutan Appeal UK (Project based in Sabangau peat-swamp Forest, Indonesian Borneo)

We also received 8 applications for the Galante Family Winery Conservation Scholarship. The conservation committee is delighted to have identified a winner in this granting cycle in Deogratias Tuyisingize. Deogratias Tuyisingize is a Rwandan national, currently acting as Manager for Biodiversity Research and Monitoring with the Diane Fossey Gorilla Fund International/Karisoke Research Center and he is conducting a Ph.D. in Biological Sciences at the University of Rwanda on the *Conservation ecology of the golden monkey (Cercopithecus mitis spp kandti) and their habitats in Rwanda*. The scholarship of \$2,500 will help cover his travel and subsistence for a training programme held over the course of 10 weeks starting in at the end of September 2019 at the University of California-Davis, USA.

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*Congratulations to this year's grantees and we look forward to another excellent group of submissions for the IPS conservation grant and the Galante Family Winery Conservation Scholarship in 2020!*

# Report on Primate Culture and Conservation

## Andrew Whiten and Martha Robbins

### Primate Culture and Conservation

Last year, along with a small group of other scientists active in research on animal social learning and culture, we were somewhat surprised, but also delighted, to receive an invitation from the United Nations Environment Program (UNEP) to a workshop in Parma, because the focus was to be an exploration of the implications of our recent discoveries about animal culture for conservation policies and practices. We've been excited to see the science of animal culture discover so much in recent decades<sup>1</sup>; now, a major body dedicated to conservation was saying "yes, we agree, and we think it matters for the very practical endeavour of conserving endangered natural populations".

This turned out to be a 'hard work'-shop. On day two we were already formed into subgroups and started writing sections of what was to become the 40-page 'Parma Report', since published online<sup>2</sup>. The meeting was held under the auspices of UNEP's *Convention on Migratory Species* (CMS), and very much 'cetacean-led', following an earlier workshop in London that laid the foundations by elucidating the implications of the cultural lives of whales and dolphins<sup>3</sup> for their conservation. In that case, the relevance to the Convention is clear: where endangered species migrate across national jurisdictions, there is a special role for UN bodies in supporting cross-nation 'Concerted Actions' for conservation, and some cetaceans migrate half way around the world, crossing several such jurisdictions. In the case of eastern Pacific sperm whales, their social structure of cultural, vocally-distinguishable clans has already been recognized in the formulation of a CMS conservation policy Resolution (citation to this and other relevant documentation in supplementary materials of<sup>4</sup>).

The cetacean conservation world may thus appear ahead of primatology in all this. This is hardly surprising given that the driver has been CMS, and primates as a group are typically not migratory. At least, not in the normal biological sense. However, CMS has started to list primates in its two appendices of species at risk, because some have very large ranges that span national jurisdictions. So far this includes *Gorilla beringei*, *G. gorilla* and *Pan troglodytes*, listed in Appendix 1, *Endangered migratory species*, which includes "species that have been assessed as being in danger of extinction throughout all or a significant portion of their range" ... "Parties that are a Range State to a migratory species listed in Appendix-I shall endeavour to strictly protect them by: prohibiting the taking of such species, with very restricted scope for exceptions; conserving and where appropriate restoring their habitats; preventing, removing or mitigating obstacles to their migration and controlling other factors that might endanger them".

Given this context, it is perhaps not surprising that only two primatologists were invited to the Parma meeting. We were outnumbered by cetologists and others working on a variety of mammalian and avian species. Nevertheless, the meeting was designed to recognize, and document, the relevance of discoveries about animal culture to conservation practice more generally, and the Parma Report is indeed wide ranging, referring to a diversity of primate species. In order to expose these efforts to a broader audience, the authors of the Report have more recently published a summary article under the 'Policy Forum' section of *Science*<sup>4</sup>. Coincidentally, in the same month *Science* published an article by Kühl et al.<sup>5</sup>, reporting the erosion of chimpanzee behavioural and cultural diversity through human impacts, independently echoing core messages about culture and conservation in the Forum Policy article. One of the purposes in writing this piece for *Primate Eye* is to highlight the remarkable and timely convergence in these two articles.



Traditional conservation policies have focused on species or other taxa as the units for conservation, defined by genomes. The articles cited above are proposing that culturally-defined units should now also be considered. Kühl et al. argue that “our findings support the concept of “culturally significant units,” whereby a more integrative approach to conservation is needed”. They promote a concept of “chimpanzee cultural heritage sites, with which the behavioural and cultural diversity of this species might be recognized and protected”. This links directly with one of two ‘test case studies’ that Brakes et al. put forward, one the sperm whale example noted above, and the other, the nut-cracking cultures distinctive of chimpanzee populations in West Africa<sup>6,7</sup>. Nut-cracking culture meets the criterion for UNEP concerted actions that the conservation unit of concern should span multiple national jurisdictions.

Whether this test-case or other Parma recommendations will progress in real terms remains to be seen. The Parma Report is progressing up through the various scientific committees and other strata of the UN for consideration at the Meeting of the Parties in India in 2020, so we shall see how its proposals fare there. In addition to the potentially rather revolutionary idea sketched above, of recognising not just genomic but also cultural units for conservation, the supplementary material to the Brakes et al. article lists nine core recommendations concerning implications of culture for conservation; the Parma Reports lists several more. Here is not the place to enumerate and discuss all these; interested readers can consult the documentation cited below. One example that indicates the issues at stake are by no means limited to those concerning the great apes is the role of cultural knowledge in reintroduction programmes. In a species that depends strongly on inheriting cultural expertise, reintroducing naïve animals into the wild neglecting this factor may be catastrophic. This is well illustrated by the reintroduction programme for golden lion tamarins, which began with 87% mortality in the first releases of Zoo-bred animals into the wild. Studies by Ben Beck, Tara Stoinski and colleagues later showed<sup>2</sup> that by contrast, where survival skills could be learned from wild conspecifics or surviving, reintroduced parents, mortality dropped as low as 30%, not dissimilar to wild-living counterparts. Humans may act as temporary reservoirs of such cultural knowledge, perhaps best illustrated by the non-primate example of captive-bred birds like cranes being imprinted on micro-lite planes, that then act as surrogate parents to reintroduce lost migration routes<sup>1</sup>. This can also be relevant for primate reintroduction, although it can be complicated by what orphans from one cultural (dietary) background might learn from those arriving at a reintroduction location from a different region and cultural background<sup>8</sup>.

Perhaps in future, other international treaties beyond CMS focused on conservation, such as CITES and CBD, may engage with these issues. Brakes et al. argue that “international policy forums – where most large-scale conservation strategies are conceived – have so far not engaged substantially with the challenges and opportunities presented by this new scientific perspective”. The IUCN, on the other hand, which provides scientific advice for these multilateral environmental agreements, has developed at least one Action Plan which has made some serious attempt to do so. The 2010 Eastern Chimpanzees Plan headed by Andy Plumptre<sup>9</sup> included as many as 38 lines of text under a section entitled ‘Cultural Variation’, plus an appendix that valiantly attempted to assess cultural variation in as many as 72 behavioural categories across 9 localities. However, this could conclude only that “Given the paucity of data on chimpanzee behaviours at some sites we can’t use this as an additional filter in selecting CCUs [chimpanzee conservation units], but it would be useful to record signs of chimpanzee tool use and culture in future surveys”. The efforts outlined above and cited below are thus only the first glimmerings of implications of primate culture for conservation; it remains to be seen how much scope there is in primatology, which has been so influential in the discovery of animal culture, to follow the lead of cetologists in incorporating our new understandings into policies and practices.

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- . Brakes P. et al. (2019) Animal cultures matter for conservation. *Science* 363, 1032-1034.
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Andrew Whiten<sup>a</sup> and Martha Robbins<sup>b</sup>

<sup>a</sup>Centre for Social Learning and Cognitive Evolution, and Scottish Primate Research Group, University of St Andrews; <sup>b</sup>Institute for Evolutionary Anthropology, Leipzig.

Note added in going to press – a comment (‘Inclusive chimpanzee conservation’) on the Kuehl et al paper and a reply from the authors recently appeared in *Science*, at:  
- <https://science.sciencemag.org/content/364/6445/1040.1>

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## International Primatological Society

### Report from Conservation Grant Recipient Christina Paddock

#### ***Population Genomics and the Viability of the Sanje Mangabey in the Udzungwa Mountains, Tanzania***

Christina Paddock<sup>1,2</sup>, Maria Joana Ferreira da Silva<sup>1,3</sup>, Pablo Orozco-terWengel<sup>1</sup>, Gráinne McCabe<sup>2\*</sup> & Michael Bruford<sup>1\*</sup>

<sup>1</sup>*Molecular Ecology Laboratory, School of Biosciences, Cardiff University, Cardiff, United Kingdom*

<sup>2</sup>*Bristol Zoological Society, Bristol, Avon, United Kingdom*

<sup>3</sup>*CIBIO/InBio, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Portugal*

*\* Joint senior authors*

Email: [paddockcl@cardiff.ac.uk](mailto:paddockcl@cardiff.ac.uk)

Awarded an IPS Conservation Grant in 2018

#### **Introduction**

Anthropogenic rainforest fragmentation can have detrimental effects on populations found in those habitats; including declines in population size, increased competition for resources, and the reduced adaptive potential of species to environmental, demographic or naturally occurring catastrophic events (Radespiel and Bruford 2014). Anthropogenically driven loss of habitat is of conservation concern as resource availability decreases and preferred or suitable habitat for species within the forest becomes increasingly patchy at a rate at which species may not be able to adapt and respond. Fragmentation can impact at a genetic level with changes to the natural genetic structure of populations and increasing isolation making them more susceptible to processes such as inbreeding depression, fixation of deleterious mutations, and the loss of rare alleles and adaptive potential (Frankham et al. 2017). Correlations between population isolation and reduced genetic diversity and reduced fitness, demographic decline, and possible extinctions have been found in wild species (Frankham et al. 2017). Therefore, without mitigating the effect



of anthropogenic activities, the isolation of these habitats is expected to continue to negatively impact the genetic diversity of vulnerable species.

The Sanje mangabey (*Cercocebus sanjei*; Figure 1) is endemic to the Udzungwa Mountains in south-central Tanzania and is found in two isolated forest blocks, separated by 120 km of agricultural land (Ehardt et al. 2005). The Sanje mangabey is listed as Endangered due to its small, fragmented population and ongoing threats such as deforestation and poaching (McCabe et al. 2019). Currently, it is unknown when the two subpopulations became isolated and the potential impact that may have had on the species' genetic structure and diversity.



**Figure 1.** A Sanje mangabey adult in Mwanihana forest, in the Udzungwa Mountains National Park.

The Udzungwa Mountains are part of the Eastern Afromontane Biodiversity Hotspot (Myers et al. 2000) and Davenport et al. (2013) considered the Udzungwa Mountains the second most important region in Tanzania for conservation as a 'Priority Primate Area'. Twelve known species of primate reside within the forests of the mountains, including two endangered and endemic species, the Sanje mangabey and the Udzungwa red colobus (*Procolobus gordonorum*), and the Critically Endangered and endemic kipunji (*Rungwecebus kipunji*), discovered in 2003 (Jones et al. 2005). Investigating the conservation status of the Sanje mangabey and the impact of the decreasing habitat size and fragmentation will help elucidate the impact on other species in the region. The increased protection of the Sanje mangabey and its habitat is not only of immediate importance for the species itself, but the conservation recommendations will aim to encompass the protection of other species within the region; including sympatric species such as the

Udzungwa red colobus, the Angolan colobus (*Colobus angolensis*) and the Sykes' monkey (*Cercopithecus albogularis*).

A species action plan is currently being developed for the Sanje mangabey, combining all previously collected demographic and survey data for the species to develop recommended actions. This project has been generating genomic data, the first genetic characterization of the species, which will be used to further inform management decisions. No previous work has been conducted to investigate the population genomics of the species; however, a previous study in the same area on Udzungwa red colobus found significant genetic differentiation among subpopulations found in the same forest blocks (Ruiz-Lopez et al. 2015).

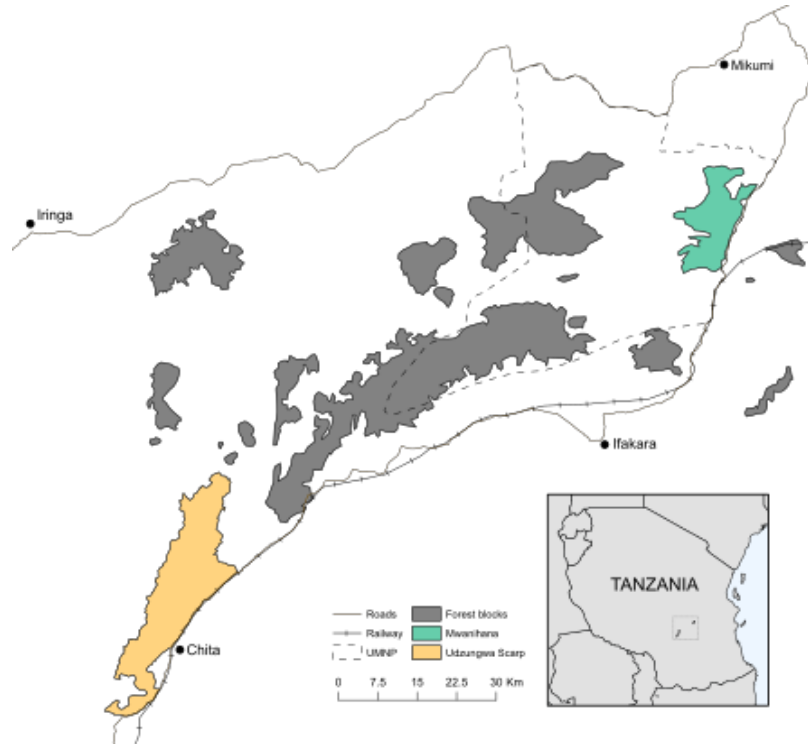
This study aims to use non-invasively collected fecal samples to produce genetic data, both mitochondrial for phylogeographic analyses, and nuclear DNA for an assessment of genomic diversity and structure. Both mitochondrial (mtDNA) and nuclear single nucleotide polymorphisms (SNPs) will be used to analyze population structure and diversity, as often results found in each can show different insights into sex-biased demographic processes, including dispersal among social units (Toews and Brelsford 2012). We predict that the Sanje mangabey subpopulations are likely to be genetically isolated, increasing the risk of detrimental genetic processes such as inbreeding, fixation of deleterious mutations, and the loss of rare alleles and adaptive potential. Therefore, genomic data will be invaluable to the development of informed recommended conservation actions.

At this stage, preliminary mitochondrial DNA has been generated and analyzed, and a novel host DNA enrichment method from Chiou and Bergey (2018) has been optimized in our lab and for the Sanje mangabey fecal samples. In this report, these preliminary results and a progress report for the nuclear DNA work are presented. Once available, these sequences will be used as input data for population and habitat viability analysis (PHVA) modelling, alongside previously collected demographic and survey data. The models will assess the predicted population and genetic trend of the population without intervention and also estimated trends with the introduction of different conservation management scenarios. The most effective conservation actions will be proposed for the Sanje mangabey to be included in the *Cercocebus* and *Mandrillus* Conservation Action Plan currently in development.

## Methods

Fieldwork was conducted June – November 2017 in the Udzungwa Mountains, Tanzania, in the only two forest blocks in which the Sanje mangabey is found: Mwanihana forest (7°40'-7°57'S,

36°46'-36°56'E), situated in the Udzungwa Mountains National Park, and the Udzungwa Scarp Nature Reserve (8°14'-8°32'S, 35°51'-36°02'E; Ehardt et al., 2005; Figure 2).



**Figure 2.** Map of the forest blocks in the Udzungwa Mountains and the forest blocks in which Sanje mangabey are found; Mwanihana within the Udzungwa Mountains National Park (UMNP) in the north-east (green), and the Udzungwa Scarp Nature Reserve in the south-west (orange).

Sanje mangabey groups were detected and located by their 'whoop-gobble' vocalizations and fecal samples were collected opportunistically. The elevation and GPS co-ordinates were recorded for each sample using a GPS device (Garmin GPSMAP 54s Handheld Navigator) for later phylogeographic analyses. Samples were stored using the two-step method from Roeder et al. (2004); samples were first submerged in 97% ethanol and then, after 48h, this was drained and replaced with silica gel (Silica Orange; Sigma-Aldrich® Company Ltd., Dorset, UK; 10087).

Samples were prepared by using a scalpel to take the surface of the feces for DNA extraction as this is most likely to have the least degraded host DNA. DNA was extracted from fecal samples using a QIAamp DNA Stool Mini Kit (Qiagen) following a modified manufacturer's protocol to optimize for the Sanje mangabey samples.

### *Mitochondrial DNA*

Two mitochondrial primer pairs were designed using an alignment of three *Cercocebus mangabey* mitochondrial genomes to amplify a 423bp fragment of the control region, once aligned and trimmed. Alignments and inspection of sequences for base quality was conducted in Geneious (v4.8.5). Species identification was confirmed using the Basic Local Alignment Search Tool (BLAST) and the Genbank nucleotide database to ensure only mangabey sequences were included in further analyses. These sequences were aligned and DnaSP v 6.12.01 (Rozas et al. 2017) was used to estimate polymorphic sites, number of haplotypes, haplotype diversity, nucleotide diversity and neutrality test Tajima's D. PopART v1.7 (Leigh and Bryant 2015) was used to infer a TCS network of haplotypes in this study.

### *Nuclear DNA and Extract Enrichment*

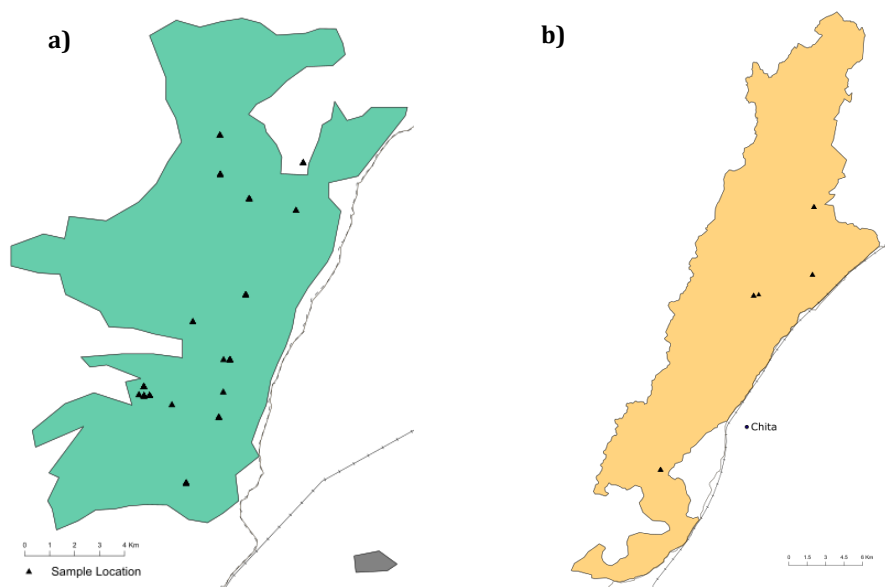
DNA extractions were enriched for host DNA using a NEBNext Microbiome DNA Enrichment Kit (New England Biolabs) following the FecalSeq protocol from Chiou and Bergey (2018). Host DNA concentration could not be quantified prior to enrichment to determine bead concentration, therefore optimization of the protocol tested a range of MBD2-Fc-bound magnetic bead concentrations. A Qubit™ 3.0 Fluorometer and Qubit™ dsDNA HS Assay Kit (Invitrogen™) was used to measure total DNA concentration before the enrichment and of the enriched extract. PCR was used to detect the presence of mammalian DNA and 16S DNA in these samples (using primers and conditions from Chiou and Bergey 2018), and visualization of PCR products on an agarose gel to predict the increase or decrease in DNA concentration of host and bacterial DNA.

Two samples were enriched and prepared using this protocol and sent for whole genome resequencing, using the Illumina HiSeq X™ Ten platform and paired-end 150bp reads (Novogene), to test if the enrichment method was retaining host DNA at a high enough concentration for successful sequencing. Sequences were trimmed for Illumina adapters and low-quality reads (Phred score >20) using TrimGalore! v0.4.0 (Krueger 2016). Trimmed sequences were then aligned to the closest available genome sequence to the Sanje mangabey, the sooty mangabey (*Cercocebus atys*; Genbank Genome ID 13303) using BWA-MEM (Li 2013).



### Preliminary Results and Discussion

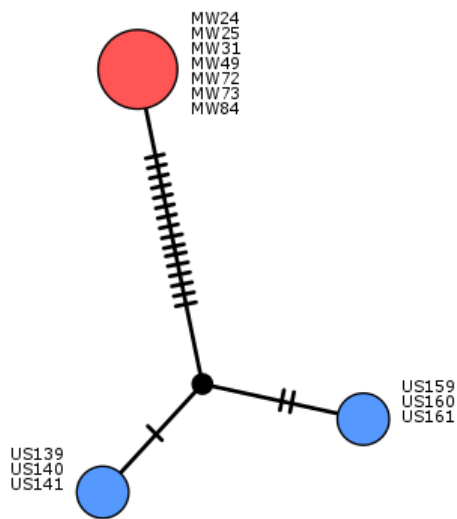
A total of 173 fecal samples were collected; 117 from Mwanihana and 56 from the Udzungwa Scarp (Figure 3).



**Figure 3.** Fecal sample collection sites (black triangles) for Mwanihana (a) and Udzungwa Scarp (b).

### Mitochondrial DNA

Currently, 7 samples from Mwanihana and 6 samples from Udzungwa Scarp are available for the full 423bp fragment of the mitochondrial control region. Overall for both forests, there were 19 polymorphic sites and 3 haplotypes (H; TCS network: Figure 4), with a haplotype diversity ( $H_d$ ) of  $0.654 \pm 0.099$  and nucleotide diversity ( $\pi$ ) of  $0.0231 \pm 0.00261$ . In Mwanihana, there were no polymorphic sites with only one haplotype present. The Udzungwa Scarp was more diverse with 3 polymorphic sites and 2 haplotypes, haplotype diversity ( $H_d$ ) of  $0.6 \pm 0.129$  and nucleotide diversity ( $\pi$ ) of  $0.00426 \pm 0.00092$ . Neutrality test Tajima's D determined a significant positive result (2.537;  $p < 0.01$ ) which may suggest a recent population contraction or that there is selection maintaining diversity. Finding only three divergent haplotypes suggests that there are very few ancient maternal lineages surviving. This is potentially a reflection of the female philopatry and low female dispersal exhibited by the Sanje mangabey, and/or the physical location of the two forests meaning the subpopulations have been isolated for a relatively long period of time.



**Figure 4.** The TCS haplotype network for the preliminary control region data with three haplotypes. Hatch marks represent mutations, the red circle represents the Mwanihana (MW) haplotype and the blue circles the two haplotypes from the Udzungwa Scarp (US). Size of the circles represent observed haplotype frequency and labels are sample names.

#### *Nuclear DNA*

The two samples sent for whole genome resequencing were found to have successfully retained mangabey sequences in the enriched DNA extract, suggesting that the enrichment protocol is working successfully and will be ready to start developing and running the ddRADseq protocol. The two samples sequenced were chosen for one being a relatively high and the other being a low total DNA concentration following enrichment. The resultant reads successfully mapped 57.14% and 10.32% of reads to the sooty mangabey genome, respectively, after reads had been filtered for adapter sequences and poor-quality reads. These percentages fall within the range found in the Chiou and Bergey (2018) paper for ddRADseq reads.

#### **Remaining Research and Conservation Action Plan**

For the mitochondrial DNA analyses, more samples have been prepared and sent for sequencing to investigate whether the current haplotype network is representative, with further samples including samples from the full extent of both forest blocks.

The nuclear DNA work is ongoing and the lab work and analyses is expected to be finished by the end of this year. Once the enriched samples have been produced, aligned polymorphic SNPs will be identified by ddRADseq next generation sequencing in 24 individuals from each forest block. Individuals will be selected from those that amplified mostly successfully in the mtDNA study, as this also ensures that the sample has been confirmed as a mangabey individual prior to ddRADseq. Statistical population genomics will then be used to characterize the distribution of genetic diversity and differentiation among individuals and between forests using methods

routinely used in our laboratory (e.g. Pan et al. 2017). Combining data from both mitochondrial and nuclear DNA, ABC toolbox (Wegmann et al. 2010) will be used to more precisely model recent demographic processes enabling very recent events to be detected and quantified.

Once the genomic data has been generated, this will be combined with existing demographic and population survey data in a VORTEX PHVA (Lacy and Pollak 2014) model and simulation. The model will be used to assess the species' current viability and to assess the impact of conservation management strategies on future population and genetic trends. Options including increased habitat protection and resource management and managed translocations will be modelled to assess the impact of different schemes. This information will be used to directly inform and develop recommended actions for the Sanje mangabey to be included within the *Cercocebus* and *Mandrillus* Conservation Action Plan that is currently being developed to be launched at the International Primatological Society 2020 Meeting.

This project has and continues to produce genomic data for a non-model species using a novel enrichment method. All sequence data will be submitted to open source databases, such as GenBank, and the methodologies and results will be presented in peer-reviewed publications and international conferences. We aim to present the results of the complete project at the International Primatological Society 2020 Meeting, alongside the launch of the *Cercocebus* and *Mandrillus* Conservation Action Plan.

### Budget

The funding awarded by the International Primatological Society was combined with funding from the Primate Society of Great Britain (PSGB) to cover costs of optimizing the enrichment protocol and part fund the ongoing development of the ddRADseq protocol, covering costs of reagents and service at the Cardiff University Genomics Hub.

Below are the costs covered by the IPS grant:

Date	Item	Cost
08/10/2019	NEBNext Microbiome DNA Enrichment Kit	\$287.28
29/01/2019	NEBNext Microbiome DNA Enrichment Kit	\$287.28
April 2019	Cardiff University Genomics Hub: ddRADseq reagents and services (partial funding)	\$925.44
<b>TOTAL</b>		<b>\$1500.00</b>

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Grateful acknowledgements go to the International Primatological Society for awarding the grant for this work to be conducted. Further acknowledgements go to Tanzania National Parks (TANAPA), Tanzania Forest Service Agency (TFS), Commission for Science and Technology (COSTECH) and the Tanzanian Wildlife and Research Institute (TAWIRI) for allowing the work to be conducted within the National Park and Nature Reserve. We would like to thank the Sanje Mangabey Project Research team, Dr David Fernández, and the staff at the Udzungwa Ecological Monitoring Centre and Udzungwa Forest Project for their assistance with the fieldwork. We acknowledge the additional financial support provided by the UK Natural Environment Research Council (NERC; CASE Studentship NE/N007980/1), Bristol Zoological Society, Primate Conservation Inc., and the Primate Society of Great Britain.

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## Report from Conservation Grant Recipient Mohamed Julius Kibaja

**Conservation of the Endangered Ashy red colobus monkey (*Piliocolobus tephrosceles*) in the Ufipa escarpment, south western Tanzania.**

**Mohamed J. Kibaja**

Centre for Ecological and Evolutionary Synthesis (CEES), Department of Biosciences, University of Oslo, P. O. Box 1066 Blindern, N-0316 Oslo, Norway;  
Department of Zoology and Wildlife Conservation, University of Dar es Salaam, Box 35064, Dar es Salaam, Tanzania

### Introduction

This report presents preliminary results of population surveys in Ashy red colobus monkeys (*Piliocolobus tephrosceles*), their conservation threats and reports the conservation campaigns carried out in the Ufipa escarpment. The purpose of this project was to contribute to the endangered Ashy

red colobus monkeys (*Piliocolobus tephrosceles*), their conservation threats and reports the conservation campaigns carried out in the Ufipa escarpment. The purpose of this project was to contribute to the endangered Ashy monkey conservation in Tanzania by: 1) determining its distribution, population status and threats in the Ufipa escarpment and 2) conducting community conservation awareness campaigns in the area. Successful conservation of a primate species requires detailed knowledge on its distribution, numbers and threats. These are important to determine conservation priorities, identify areas of high conservation value and design successful management plans for the species (Groves *et al.*, 2002) as well as to guide the creation of protected areas, corridors, buffer zones, demarcation of boundaries and tourism planning (Kühl *et al.*, 2008).

Ashy red colobus monkeys are folivorous monkeys that feed predominantly on leaves (Struhsaker, 1975; Kibaja, 2012, 2012, 2014). They exist in western Uganda and western Tanzania (Struhsaker, 2005). In Tanzania, they are found in Mbizi and Mbuzi forests on the Ufipa plateau, in Gombe Stream and Mahale Mountains National Parks on the eastern shores of Lake Tanganyika (Rodgers, 1981; Davenport *et al.*, 2007) and in the Masito-Ugalla Ecosystem (Ogawa *et al.* 2004; Moyer *et al.*, 2006).

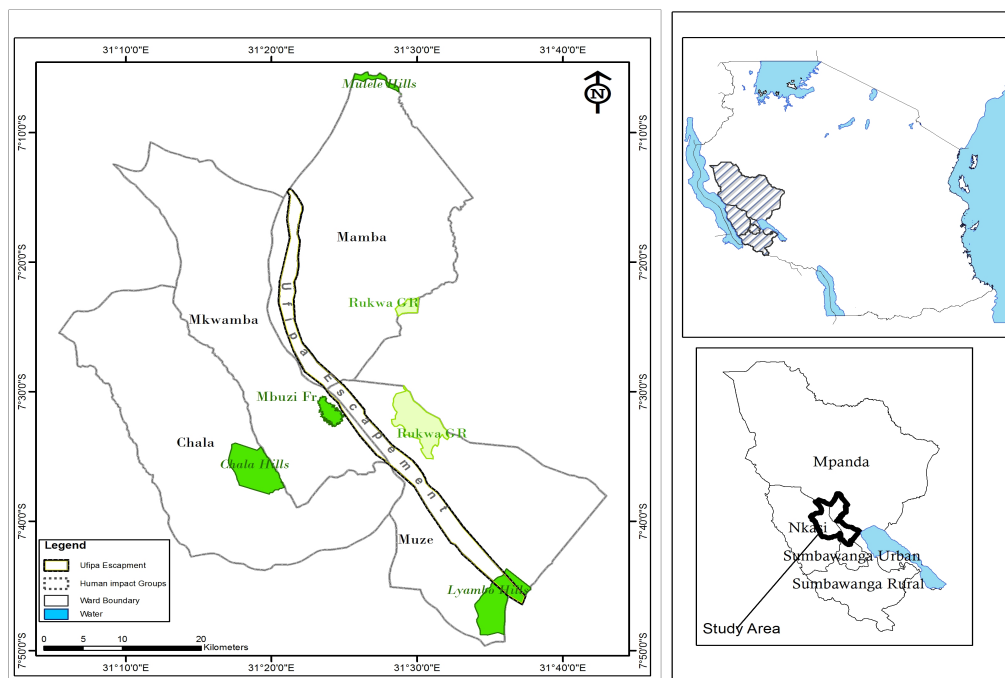
They are an endangered species (Struhsaker, 2008; 2016). Their population sizes are declining due to chimpanzee predation and habitat alterations (Watts and Mitani 2002; Struhsaker 2005, 2016). Their population size has been estimated at 20,000 individuals in all its geographic range; with the largest known population in Kibale National Park, Uganda (Struhsaker, 2005; Chapman *et al.*, 2007). Censuses conducted a decade ago in the Ufipa plateau estimated a population size of 1354 Ashy monkeys: 1217 and 137 individuals were in the Mbizi and Mbuzi Forests respectively (Davenport *et al.*, 2007). The average group size has been reported as 45-50 individuals in Kibale and 55-59 individuals in Gombe (Struhsaker and Gubbs in Oates *et al.*, 2008), and 40.56 and 34.25 in Mbizi and Mbuzi forests respectively (Davenport *et al.*, 2007).

The Ufipa escarpment was previously surveyed in 2015/2016 using IPS 2015 funds but those surveys did cover the entire escarpment. Thus, the present status of the species in the Ufipa escarpment (adjoining the Ufipa plateau) is largely unknown. It was imperative to systematically survey this primate in remaining unsurveyed part of the southern escarpment as well as conducting increased conservation campaigns.

## Methods

Surveys were conducted in the Ufipa escarpment (07° 21' 31° 20'E) adjoining the Ufipa plateau to the west. The Ufipa escarpment is the wall (narrow stretch) of the Rukwa rift, west of Lake Rukwa valley

(Figure 1). Its steep slope rises from the valley floor at 792 m to an undulating ridge as high as 2438 m, allowing altitudinal zonation of many plants (Pileau, 1952) (Figure 2).



**Figure 1:** Study area showing the northern part of Ufipa escarpment, Sumbawanga Rural District Council, Rukwa Region.

### Data collection and analysis

Surveys and conservation campaigns were conducted from July 2017 to February 2019. The project was supposed to conclude in March 2019. This work completed within the allotted time frame because of my presence in Tanzania before my attendance to the IPS XXVII<sup>th</sup> Congress in Nairobi, Kenya August 2018. The period from April to June 2019 is reserved for writing manuscript for publications. Two teams of three people each simultaneously searched for Ashy monkeys using trails (following Peres, 1999). When a group was encountered, the number of individuals, sex and age composition, sighting distances to the group, GPS position and bearing from the observer to the group were recorded. When we encountered a group we followed it from 10 to 30 minutes to ensure that all individuals were counted (e.g. Chapman *et al.*, 1988). Mean group size was obtained by dividing the total number of individuals from all groups by the number of groups.

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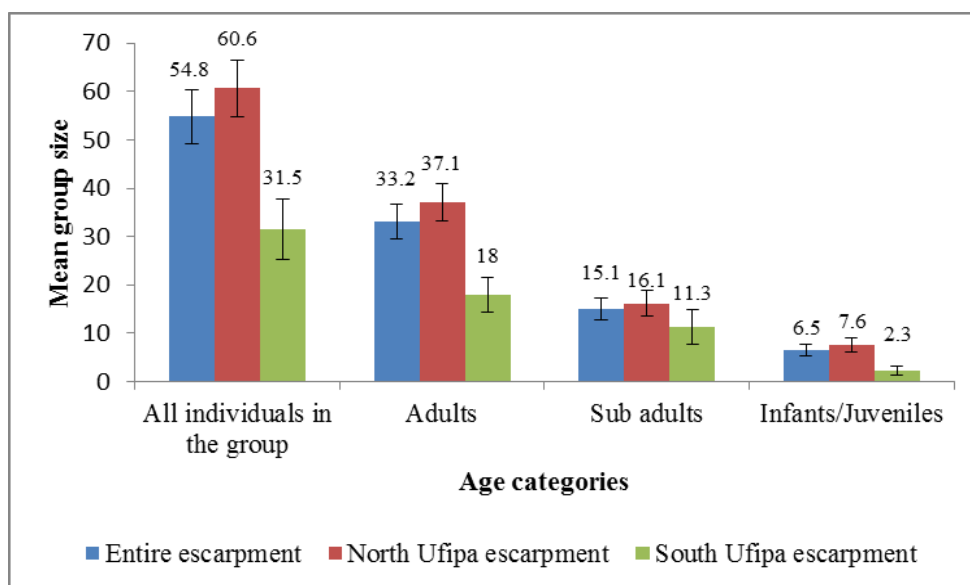
**Figure 2:** A section of the Ufipa escarpment during the rainy season, Sumbawanga District Council, Rukwa Region.

## Results

A total of 88.3 km were walked in the entire stretch of Ufipa escarpment of which 53.3 km were walked in the northern part (previously supported by IPS 2015 Funds) and 35.0 km in the southern part (recently supported by IPS 2018 Funds). At least 20 groups were found: 16 were previously counted between 2015 and 2017 period while only 4 groups were found in the recent survey in the southern section of the escarpment. Of six villages surveyed in the southern escarpment (e.g. Mtowisa, Ilemba, Kaoze, Nsanga, Nkusi and Chombe villages), all the four (4) groups were found at Mtowisa village, close to the Mbizi Forest Reserve.

The overall mean of group size in the Ufipa escarpment was  $54 \pm 5.50$  with group size ranging from 20 to 98 individuals (Figure 3 and Table 1). Groups also varied in size from 30 to 98 individuals in the northern part and 20 to 49 individuals in the southern part of the escarpment (Table 1).

About 55% (N = 11) of the groups were found in gallery forests and 45% (N = 9) were found in dense woodland (Figure 4). Few groups were found in the southern part of the escarpment because this part was severely affected with cultivation, sawing, charcoal making and livestock keeping. Ashy monkeys in the Nsangu forest fragment on the southern part of the escarpment was previously feared extinct by Davenport et al. (2007). The recent survey in this site (Nsangu) had not revealed Ashy monkeys and therefore I confirm that Ashy monkeys are locally extinct as previously reported by Davenport et al (2007).





**Figure 3:** Mean group sizes of Ashy monkeys in different age classes**Table 1:** Range of group sizes of Ashy monkeys for different age group classes

	All individuals	Adults	Sub adults	Infants/Juveniles
North Ufipa escarpment	30-98	18-74	0-41	0-21
South Ufipa escarpment	20-49	11-28	2-19	0-7
Entire escarpment	20-98	11-74	0-41	0-21

**Figure 4:** Ashy monkeys in a woodland habitat of the Ufipa escarpment, Sumbawanga District Council, Rukwa Region.

### Conservation threats

Livestock grazing and bushfires are a common problem in the Ufipa escarpment, the southern part being severely affected. A variety of human signs were observed, with the leading ones being sawing and charcoal making (Table 2, Figures 5 and 6). The most logged tree species are *Sterculia quinqueloba* used for roofing, *Brachystegia bussei* and *B. globiflora* for charcoal making. These tree species are among the most important food species for this monkey in the escarpment (Kibaja et al. on progress). Even though the northern part of the escarpment remains more or less intact, it was abundant in many livestock signs (cowsheds) especially in the rainy season. It is a common practice for livestock herders to graze their livestock in harvested farms on the Ufipa plateau in the dry season and then migrate stealthily in the escarpment during the rainy season. Few plots of marijuana (*Cannabis sativa*), which are illegal in Tanzania were also found in the escarpment.



**Figure 5:** Sawing activities at Nsangu forest fragment at the southern part of the escarpment, Nsangu village, Rukwa Region.



**Figure 6:** Selective logging at Kaoze and Nsangu villages in the southern part of the Ufipa escarpment, Sumbawanga Rural District Council, Rukwa Region.

**Table 2:** Encounter rates of human signs in the Ufipa escarpment.

	North Ufipa escarpment	South Ufipa escarpment	Entire escarpment
Charcoal kilns	0.39	0.14	0.27
Cowsheds	0.34	0.09	0.22
Felled trees	0.26	0.09	0.18
Sawing pits	0.19	0.54	0.37
Farms	0.15	0.2	0.18
Huts	0.15	0.03	0.09
Traps	0.11	0.06	0.09
Cattle herds	0.06	0	0.03
Medicinal tree cuts	0.02	0	0.01
Local irrigation furrow	0.02	0	0.01

Pole cutting	0.02	0	0.01
Poachers camps	0	0	0.00
Beehives	0	0	0.00
Cattle trails	0	0.31	0.16
Mining pits	0	0.03	0.02

### Conservation campaigns and action plan

A part of my IPS 2018 funding was spent for conservation campaigns of the species in the Ufipa escarpment. Conservation campaigns were conducted for different targeted groups: villagers, elders, village leaders (Village executive officers), students (primary and secondary schools), forest guards, District Forestry officers, ad-hoc livestock herders and pit sawyers regarding the presence of Ashy monkeys and their habitats. Talks were given to Tanzania Forestry Services (TFS) officers of the Ministry of Natural Resources and Tourism in respective District councils (Mpimbwe and Sumbawanga Rural Districts). Lectures, excursions and poster displays were held to sensitize audiences (primary and secondary school students, villagers and village committees) in selected villages from Mfinga and Mwadui wards along the Ufipa escarpment and additionally to Chala forest 15 km away from the escarpment (Figures 7-10). Face to face interviews were held for farmers, ad-hoc poachers, pit sawers and cattle herders found inside the escarpment about the conservation status of Ashy monkeys. There must be increased conservation education in the northern part of the escarpment owing to presence of many groups of Ashy monkeys compared to the southern part. Generally, I am of the opinion that Ashy monkeys in the Ufipa escarpment should be given a serious conservation attention and increased conservation campaigns.



**Figure 8:** Conservation campaigns to some primary school teachers, in the study area, Rukwa Region.





**Figure 10:** Conservation campaigns in secondary schools in the study area, Ufipa plateau Rukwa Region.

### Conclusion and recommendations

Anti-poaching activities should be intensified in the Ufipa escarpment and other fragile forest fragments on the Ufipa plateau such as Chala Forest. The Government should increase the number of village scouts in villages bordering the escarpment. It should also increase the number of wildlife rangers (forest guards) in the adjacent protected areas (e.g. Rukwa Game Reserve) who can work together with village scouts in cracking down poaching and illegal use of resources. Community conservation should be increased for endangered primates and other wildlife occupying the escarpment and adjacent forests on the Ufipa plateau.

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village) and many other field guides from Kaoze, Nsangu/Nkusi and Chombe villages in the Sumbawanga Rural District Council in Rukwa Region.

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# Report from Education Development Grant Recipient Tatiane Valença

## Report from Lawrence Jacobsen Education Development Grant Recipient

### “Protecting monkeys as a way of combating Yellow Fever” - By Tatiane Valença

In 2017-2018, a yellow fever outbreak in the state of São Paulo (Brazil) brought fear to the population. According to São Paulo State Secretary of Health, there were 257 cases of yellow fever in nonhuman primates last year, 537 cases in humans and 183 human deaths. As a result of a panic reaction, misinformed people have been killing the animals, believing that the monkeys were causing the disease and that killing was a good strategy to stop epidemic. This behavior makes the situation even worse to monkey populations, which have a fundamental role as disease sentinels.

In order to stop monkey's deaths by misinformed people and to promote people's health in this context, the aim of our project was to increase community awareness about the important role of monkeys in surveillance of yellow fever virus circulation, and to reinforce a healthier human-monkey relationship. We focused on Tietê Ecological Park (TEP), an urban park which faced some problems related to this question, including temporary closing from November/2017 to January/2018. But we also developed the project in other places of São Paulo city where some cases of this disease were spreading or where there were people who frequent these places. The financial support of IPS Lawrence Jacobsen Education Grant enabled us to develop several activities and materials last year:

#### 1. “Protect our Guardian Angels of TEP” campaign

This action was inspired by the “Protect our Guardian Angels” campaign by Bicca-Marques and Freitas (2010). We offered three workshops to school teachers, college and undergraduate students, health agents and people from the community around TEP (126 participants). During workshops, we taught about the epidemiology and prevention of yellow fever, primate ecology and behavior, the importance of primate conservation, showed educational materials and discussed strategies to prepare activities and to engage other people in the campaign.



Workshop: a primatologist teaching about primate behavior and conservation

Two elderly groups of people from community nearby TEP who attended the workshops liked the suggestion to elaborate activities to engage other people. These groups adapted a theatre play previously elaborated by Bicca-Marques team to their context, and we supported their activities (e.g. costumes, transport, scientific information, etc). Their plays were so successful that they have been invited to present in more and more places, totalizing 24 sessions last year in several places of the city (schools, zoo, parks, transport stations, library, universities, etc) watched by 2066 people of all ages. The public had a lot of fun, and the discussions later the play showed that they understood and learned especially the importance of getting vaccinated and do not attack the monkeys. It was the best strategy!



Theatre costumes: mosquitoes and virus of yellow fever



Theatre play in Tietê Ecological Park



Theatre play in a school

2. Monkey talks – We promoted talks about primatology to propagate scientific information, to increase awareness of the monkeys' role in preventing yellow fever, and to discuss healthy ways to engage in interactions with nonhuman primates. Curiosity questions of families and students were answered by a primatologist. We realized that families do not stay a long time in this kind of activities because of short children attention, then the most important information have to be told at the start.

3. Monkey watching – We promoted guided monkey watching when people were able to see primates' behavior by their own and learned about it accompanied by a primatologist. We showed



some ethological techniques, how to observe animals with less impact on their well-being, and the importance of primate conservation.



Family observes nut cracking by a capuchin monkey

4. Animal vacation – During two weeks in school vacations we offered in TEP a range of ludic activities with primate theme to children: animal's footprint activities, drawing and painting, theater play and storytelling. After these activities, children and their families attended an ecological walking to watch monkeys and discussed conservation. While children were engaged in the activities, we talked to their parents about yellow fever and distributed educational flyers.



Families showing their drawings of monkeys and receiving educational material (on the table)



Families engaged in monkey painting



Participants preparing to a guided walk after theatre play during Animal Vacation event

## 5. Educational flyers

We developed educational flyers to explain the cause and transmission of yellow fever, possibilities of prevention and importance to protect the monkeys. These materials are full of images and colors, and contain a comic story. They have been delivered after the sessions and other activities of the project to key people (health agents, teachers, etc) to be distributed in other places to spread even more the message.





Educational flyers content



Educational flyers printed

## 6. Educational sign boards

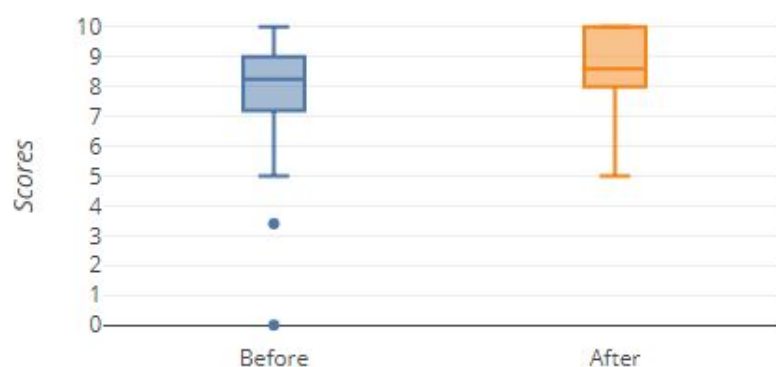
We developed three educational sign boards to Tietê Ecological Park: one aiming to approximate public with the monkeys through a scenery to take pictures, and calling attention to the others; and two side-by-side with this one indicating how visitants may engage in human-primate interactions with less negative impact to both animals and people.





Woman taking photos with a howler monkey in the scenery board (right), and a smaller educational sign board (left) with instructions about a healthier relationship with animals

We assessed students' knowledge through questionnaires before and after workshops and talks, and compared to evaluate whether our activities had an impact on their knowledge. Questionnaires contained questions about epidemiology of yellow fever, prevention and role of nonhuman primates in this context. 221 people took part in these activities, and 90 of them answered the surveys before the activities, and most of them answered adequately about the vaccination as a way of prevention, and about viruses as causing the disease. However, how viruses cause the disease is a source of confusion to the public and some people believed hand washing is a way to prevent transmission, and that yellow fever may be transmitted when an infected person sneezes. Additionally, 11,11% of people who answered the surveys believed that yellow fever could be transmitted through bites of infected monkeys. These answers highlighted why some people have afraid of monkeys and consider that killing monkeys is a good way of prevention. 73,3% of people who answered the survey before the activities also answered the same survey after. We transform each questionnaire in a score 0-10, and compared before and after situation (Figure X). Mean score after (Mean= 8,64; DP= 3,97) were higher than before (Mean= 7,88; DP= 1,66), and the difference were significant accordingly to Wilcoxon test  $Z = -3,496$ ;  $p = 0,00$ ). Then, we found that public knowledge about yellow fever increased after the workshops and talks.



Survey scores distribution before and after activities

The other activities were more focused on children with their families and were offered in leisure contexts, which make participation in the surveys more difficult. So evaluation was done by monitoring the number of participants (Animal Vacation: 700 participants; Monkey Watching: 30 participants) and oral discussion with the public. We also checked if their draws were representing positive aspects of primates and if they illustrate typical characteristics of the most common monkeys.



Drawings of a boy representing howler monkey (*Aloauatta* sp., top), capuchin monkey (*Sapajus* sp., left) and marmoset (*Callithrix* sp., right)

In Tietê Ecological Park, we monitored from January to September the number of people who visit a region frequented by the monkeys, human-monkey interactions rates and monkey deaths. The number of visitants stayed low until February, and increased gradually since April, achieving higher rates in July. Comparing to our data from 2016, human-monkey interactions stayed low until May, starting to increase in June, and achieving the same rates of the previous year since June (complete analysis will be published later). No monkey deaths by people were recorded during project activities and human-monkey interactions returned to the baseline after some months. We cannot be sure about the amount of our project's influence on this improvement because the disease is cyclical, and human deaths and media coverage decreased along time. So, the aims of this project were fulfilled, but we have to maintain vigilance and persist with the activities to guarantee the health of human and nonhuman primates.

# Report from Conservation Grant Recipient Paul Tehoda

## **STATUS AND CONSERVATION OF THE CRITICALLY ENDANGERED WESTERN CHIMPANZEE IN SOUTHWESTERN GHANA**



### **FINAL REPORT**

**By**

**Paul Tehoda**

**Department of Wildlife and Range Management**

**Faculty of Renewable Natural Resources**

**Kwame Nkrumah University of Science and Technology**

**Kumasi, Ghana**

**paultehoda@yahoo.com**

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### Introduction

The global western chimpanzee population has dramatically declined by more than 80% over the past 24 years (Kühl *et al.*, 2017) and it is currently classified as Critically Endangered on the IUCN Red List. Besides this alarming information, the population status of the western chimpanzee is poorly known across its range, especially in Ghana. In 2015, a preliminary survey we conducted in Southwestern Ghana showed that Bia Conservation Area could plausibly hold the most significant population of western chimpanzee in Ghana. To preserve this suspected significant population of western chimpanzee in Ghana, this project was initiated in July 2017 to investigate the conservation status of the western chimpanzee in Bia Conservation Area and foster community conservation support for the subspecies. Specific objectives of the project were as follow: 1). to determine population size and distribution of chimpanzees; 2). to identify and document threats to continuous survival of the subspecies; 3). to carryout stakeholder dialogues and community conservation awareness campaign; and 4) build capacity of volunteers in primate survey and conservation techniques.

### Material and Methods

Field surveys were conducted using a combination of line transect and recce walks. A total 140 line transects of 1 km long was systematically laid to cover the whole study area. Out of this total line transects laid, 115 were surveyed using Standing Crop Nest Count (SCNC) survey method in accordance with distance sampling methods. Also, between the line transects, recce walks were conducted. The Standing Crop Nest Count (SCNC) method requires only a single transect passage and the derived density estimate is based on all nests encountered independent of age (Tutin & Fernandez, 1984). Walking direction on each transect was maintained by compass bearing. On each transect, signs of chimpanzee activities (nests, feeding signs, vocalization) and illegal human activities (wire snare, empty cartridge, illegal chainsaw etc.) were recorded. Also, habitat screening was conducted at areas where chimpanzee activities were recorded to identify direct threats to the subspecies immediate habitat. Eight camera traps were also set up at areas suspected to be suitable habitats for chimpanzee activities. In addition to field surveys, conservation awareness campaigns and stakeholder dialogues were carried out. The conservation awareness campaigns were delivered in the form of talks, video shows and power point presentations on topics such as chimpanzee biology, conservation status, threats, ecological and economic significance of chimpanzees, human-primate infectious diseases transmissions and the role of stakeholders in chimpanzee

conservation and habitat protection. Also topics on good agricultural and agroforestry practices and techniques were discussed. Stakeholder workshop was also organized to discuss the findings of the research and conservation measures needed to protect long term persistence of the subspecies.

## **Results and Discussion**

### **i. Population size and distribution of chimpanzees**

In total, we recorded 44 chimpanzee nests along both the recce walks and the line transects providing nest encounter rate of 0.21 nests/km walk. Encounter rates of nests along line transect only and recce transects only were 0.24 nests/km and 0.17/km respectively. Additionally, 25 feeding signs were also recorded given overall encounter rate of chimpanzee activities as 0.33 nests/km walk. No direct sightings of chimpanzees were made but calls were heard on two different occasions at different locations in the reserve. Using the package Distance 7.1, chimpanzee density was estimated as 0.08 weaned individuals per km<sup>2</sup>, yielding population size of 24 weaned individuals with confidence interval ranging from 13 to 46 weaned individuals for the Bia Conservation Area during the survey period. This estimate is imprecise as indicated by the relatively wide confidence limits of the estimated chimpanzee population size, which suggests large margins of error which are often a problem when assessing small populations (Taylor & Gerrodette, 1993; Barnes, 2002; Danquah *et al.*, 2012). The distribution of chimpanzee activities (nests) have shown that the subspecies occurs in both the National Park and Resource Reserve areas of the Bia Conservation Area. However, developed spatial distribution map shows that the subspecies is concentrated at the southeastern part of the Bia Conservation Area (Fig 1).

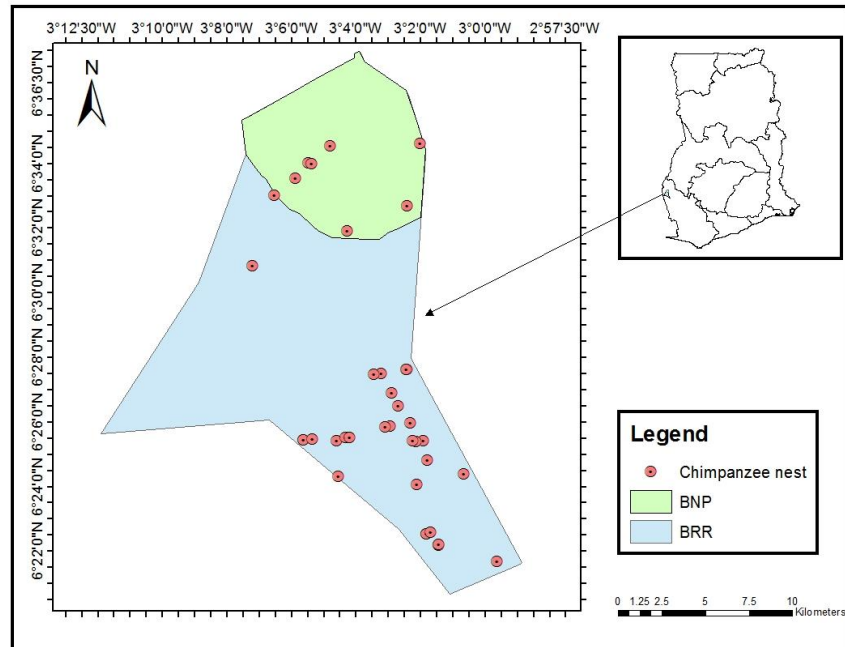


Figure 1. Map of the distribution of all nests recorded in the Bia Conservation Area

## ii. Identify and document threats to continuous survival of the subspecies

A total of 268 signs of illegal human activities (Fig. 2) comprising of wire snares, empty cartridges, burnt trees (sign of hunting by fire), poachers camp and gunshots (Plate 1) were identified and recorded in the reserve. This provides an encounter rate of illegal human activities at 1.3/km walk. The relationship between the distribution of chimpanzee and illegal human activities on transects surveyed was positively significant using the Spearman rank correlation ( $R = 0.247$ ;  $p = 0.01$ ). Further analysis to see which particular human activities have significant relationships with chimpanzee distribution revealed that active wire snare and cartridge case have significant positive correlation with the subspecies. Also hunting by fire has insignificant negative correlation with distribution of the subspecies. These shows that there is great human pressure on the subspecies habitat and is a serious threat to their long term survival. Although, there were no



records of direct killing of chimpanzees in the project site, these hunting activities observed at the site are indirect threats to survival of chimpanzees in the Bia Conservation Area.

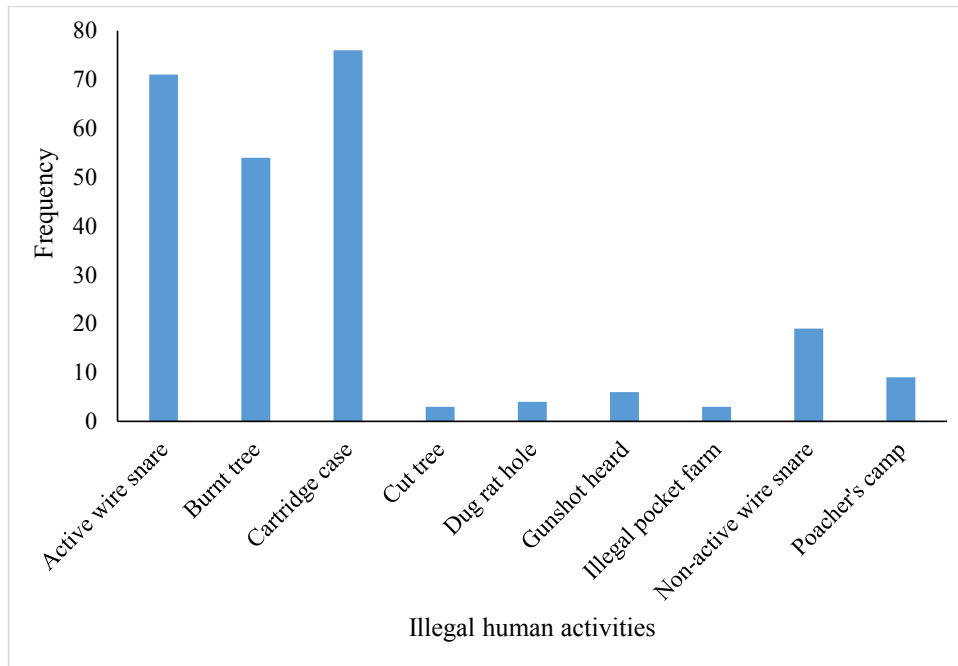


Figure 2. Frequency distribution of illegal human activities in the BCA.

Plate 1. Photographs of signs of human activities identified in BCA. A: Illegal pocket farm; B: Burnt tree, C: Poacher's camp, D: Cartridge case, E: Active wire snare, F: Cut tree



### **iii. Conservation awareness campaigns and stakeholder dialogues**

A total of about 2100 people were reached out with our conservation awareness campaigns and stakeholder dialogues in eight different fringe communities of the Bia Conservation Area. Also, analysis of our questionnaires showed that our conservation awareness campaigns have provided over 42% increase (from 35% to 77%) in knowledge and understanding of local people on the biology, ecology, threats, human-chimpanzee disease transmission and importance of chimpanzee and conservation. Our questionnaires also showed that about 75% of the respondents are in full support of conservation of the chimpanzees and will not kill the subspecies under any circumstances. The awareness campaigns have currently fostered community conservation support for the chimpanzees and other wildlife species, and forest protection in the Bia Conservation Area. The locals have started adopting good environmental practices including control burning in their farms, gradually restricting from indiscriminate hunting of wildlife species and hunting by fire, creating buffer to forest border, avoiding open defecation in the forest as a possible medium of human-chimpanzee disease transmission. Furthermore, we organized a stakeholder workshop among key stakeholders (Staff of the Bia Conservation Area, Community leaders, farmers, chain saw operators etc.) to share the research findings and highlight the importance of chimpanzee conservation and forest protection. We collectively identify some pragmatic conservation actions needed for the long term persistence of the subspecies.

### **iv. Capacity building of volunteers in primate survey and conservation techniques.**

Ten volunteers made up of four university students and six locals were successfully trained in standardized chimpanzee survey and conservation techniques as well as how to use some basic field survey equipment. This has increased the number of citizen scientists and university students in primate research and conservation effort in Ghana. Two of the trained students are currently designing projects on chimpanzee for their final year thesis work. The six trained local conservation personnel are currently volunteering to continue with conservation education programs among community members, and monitor and address basic conservation challenges in and around the conservation area.

### **Conclusions**

This project confirmed the presence of chimpanzees in Ghana and provided very low estimate of 0.08 chimpanzee density and population size of 24 individuals for the Bia Conservation Area. However, this is currently the first site specific density and population estimates of the subspecies in Ghana and will help monitor future population trend of the subspecies in the project site. The project documented illegal human activities that are threats to the subspecies in the Bia Conservation Area. Statistically, a significant positive correlation exist between chimpanzee activities and illegal human activities in the Bia Conservation Area. Spatial distribution of signs of illegal human activities covered almost all parts of the Bia Conservation Area and highly overlapped with chimpanzee activities, indicating that there is pressure on the subspecies habitat. This situation, as well as the low chimpanzee density and population estimates recorded in the Bia Conservation Area, are alarming and pose serious concerns for the long term persistence of this subspecies in its most easterly geographical distribution. Urgent conservation actions are needed to prevent the extinction of chimpanzee in the Bia Conservation Area and Ghana as a whole. The project has also rally local community support for primate conservation through its conservation education and stakeholder dialogues across eight fringe communities of the Bia Conservation Area. Continuous and extended conservation awareness campaigns to other fringe communities are needed to garner more support for total protection of the subspecies and its habitat.

### **Acknowledgement**

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