Tufts UNIVERSITY | Cummings School of Veterinary Medicine

Department of Infectious Disease and Global Health

September 30th 2019

To whom it may concern,

The enclosed application is for the importation of wildlife samples as part of ongoing research on infectious disease in trafficked and wild primates in Peru. We request a permit to cover multiple imports of the same sample types over the course of 5 years in order to continue our research.

The samples collected for current import were blood, saliva, and feces obtained from wild-born primate species in Peru. Question 5 detailing the samples collected is attached as a separate document. Under counsel of the Office of Management Authority, we have completed Question 9 of the 3-200-37 permit application, however none of the animals sampled were placed or temporarily held in captivity for the purposes of this research. Some individuals sampled were housed in a captive rehabilitation and release facility at the time of our research, and some were free-ranging and only sampled non-invasively. None of the animals sampled were bred in captivity, however some infants may have been born in captivity in the event that a wild-caught female was pregnant at the time of admission to the rehabilitation facility.

Attached in the spreadsheet is a list of the samples we currently have in hand from Peruvian Appendix I primates (stored in Peru, as indicated in this application). We request a permit to import these samples, as well as any additional samples that we collect from any Peruvian Neotropical primates that may end up in rescue centers in Peru over the course of this research. A list of species we anticipate may be present in this context is attached.

Please do not hesitate to contact me with any additional questions and concerns you may have regarding this application.

Sincerely,

Marieke Rosenbaum, DVM, MPH, MS
Marieke.Rosenbaum@Tufts.edu
(617) 605-9089

200 Westboro Road, North
Grafton, MA 01536
TEL: 508.887.4374 | FAX:
508.839.7911

IUCN / SSC PRIMATE Specialist Group

PRIMATES OF PERU

Taxonomy and Conservation Status

July 2006

Family Callitrichidae

Cebuella pygmaea niveiventris	Pygmy marmoset	LC
Cebuella pygmaea pygmaea		LC
Callimico goeldii	Goeldi's monkey	NT
Saguinus fuscicollis crandalli	Crandall's saddle-back tamarin	DD
Saguinus fuscicollis fuscicollis	Spix's saddle-back tamarin	LC
Saguinus fuscicollis illigeri	Illiger's saddle-back tamarin	LC
Saguinus fuscicollis lagonotus	Red-mantle saddle-back tamarin	LC
Saguinus fuscicollis leucogenys	Andean saddle-back tamarin	LC
Saguinus fuscicollis nigrifrons	Geoffroy's saddle-back tamarin	LC
Saguinus fuscicollis weddelli	Weddelli's Saddle-back tamarin	LC
Saguinus imperator imperator	Black-chinned emperor tamarin	DD
Saguinus imperator subgrisescens	Bearded emperor tamarin	LC
Saguinus labiatus labiatus	Lesson's saddle-back tamarin	LC
Saguinus mystax mystax	Spix's mustached tamarin	LC
Saguinus nigricollis graellsi	Graell's black-mantle tamarin	LC
Saguinus nigricollis nigricollis	Spix's black mantle tamarin	
Saguinus tripartitus	Golden-mantle saddle-back tamarin	LC

Family Cebidae

Saimiri boliviensis boliviensis	Bolivian squirrel monkey	LC
Saimiri boliviensis peruviensis	Peruvian squirrel monkey	LC
Saimiri sciureus macrodon	Ecuadorian squirrel monkey	LC
Cebus albifrons aequatorialis	Ecuadorian capuchin	NT
Cebus albifrons albifrons	White-fronted capuchin	LC
Cebus albifrons cuscinus	Shock-headed capuchin	LC
Cebus albifrons yuracus	Andean white-fronted capuchin	DD
Cebus apella macrocephalus		
Cebus apella peruanus		

Family Aotidae

Aotus azarae boliviensis	Bolivian night monkey	LC
Aotus miconax	Andean night monkey	VU A2cd
Aotus nancymaae	Ma's night monkey	LC
Aotus nigriceps	Black-headed night monkey	LC
Aotus vociferans	Noisy night monkey	LC

Family Pitheciidae

Callicebus brunneus	Brown titi	LC
Callicebus caligatus	Chestnut-bellied titi	LC

Callicebus cupreus	Red titi, Coppery titi	LC
Callicebus oenanthe	Andean titi, Isabelline titi	VU B1ab(iii)+2ab(iii)
Callicebus torquatus	White-collared titi	LC
Pithecia aequatorialis	Equatorial saki	LC
Pithecia irrorata irrorata	Gray's bald-faced saki	LC
Pithecia monachus milleri	Miller's monk saki	VU A2c
Pithecia monachus monachus	Geoffroy's monk saki	LC
Cacajao calvus ucayalii	Ucayali bald-headed uacari	VU A2cd

Family Atelidae

Alouatta palliata aequatorialis	Ecuadorian mantled howling monkey	LC
Alouatta seniculus juara	Juruá red howling monkey	DD
Alouatta seniculus seniculus	Red howling monkey	LC
Ateles belzebuth	White-bellied spider monkey	VU A2acd
Ateles chamek	Black-faced black spider monkey	LC
Ateles paniscus	Red-faced black spider monkey	LC
Lagothrix cana cana	Geoffroy's woolly monkey	NT
Lagothrix lagothricha	Humboldt's woolly monkey	LC
Lagothrix poeppigii	Poeppig's woolly monkey	NT
Oreonax flavicauda	Yellow-tailed woolly monkey	CR B1+2abcde, C2a

Total Taxa: 51
Total Threatened: 6
Percent Threatened: 12%

Note: This is presented as a working taxonomy and is not definitive.

The conservation status of each species is based on assessment summaries provided by the **IUCN Red List**. The Red List website offers more information on the **threat categories** listed here.

References

Groves, C. P. 2001. *Primate Taxonomy.* Smithsonian Institution Press, Washington, DC.

Pacheco, V., Macedo, H. de, Vivar, E., Ascorra, C. F., Arana-Cardó, R. and Solari, S. 1995. Lista anotada de los Mamíferos Peruanos. Occasional Papers in Conservation Biology No. 2, Conservation International, Washington, DC.

Wilson, D. E. and Reeder, D. M. 2005. *Mammal Species of the World: A Taxonomic and Geographic Reference.* The Johns Hopkins University Press, Baltimore.

IUCN

SSC
Species Survival Commission

Scientific name	Common name	Age	Wild or captive-born	Quantity	Amount (uL)	Gender	Permanent markings	Type of sample
Ateles sp.	Spider monkey		Wild	1	100	Unknown	SVS0223	Serum
			Wild	1	100	Unknown	SVS0226	Serum
Cacajao calvus	Bald-headed Uakari	Adult	Wild	1	20	Male	SVS0016	DNA
		Adult	Wild	1	300	Male	SVS0016	Blood
		Adult	Wild	1	10	Male	SVS0016	Serum
		Adult	Wild	1	20	Male	SVS0017	DNA
		Adult	Wild	1	300	Male	SVS0017	Blood
		Adult	Wild	1	10	Male	SVS0017	Serum
		Adult	Wild	1	400	Male	SVS0018	Blood
		Adult	Wild	1	50	Male	SVS0018	Serum
		Adult	Wild	1	200	Male	SVS0019	Blood
		Adult	Wild	1	10	Male	SVS0019	Serum
Callimico goeldii	Goeldi's Monkey	Adult	Wild	1	300	Female	SVS0023	Blood
		Adult	Wild	1	10	Female	SVS0023	Serum
		Adult	Wild	1	200	Male	SVS0024	Blood
		Adult	Wild	1	5	Male	SVS0024	Serum
		Adult	Wild	1	200	Male	SVS0025	Blood
		Adult	Wild	1	10	Male	SVS0025	Serum
		Adult	Wild	1	100	Male	SVS0026	Blood
		Adult	Wild	1	10	Male	SVS0026	Serum
Saguinus sp.	Tamarin		Wild	1	2	Unknown		Feces
			Wild	1	10	Unknown		Buccal swab
			Wild	1	2	Unknown		Saliva
			Wild	1	2	Unknown		Blood
			Wild	1	1	Unknown		Serum
Saimiri sp.	Squirrel Monkey		Wild	1	400	Male	SVS0051	Blood
			Wild	1	10	Male	SVS0051	Serum

Form 3-200-37

OMB Control No. 1018-0093
Expires 08/31/2020

RCVD OCT 07 2019

LB

Department of Interior
U.S. Fish and Wildlife Service
Federal Fish and Wildlife Permit Application Form

U.S. Fish and Wildlife Service
Division of Management Authority
Branch of Permits, MS: IA
5275 Leesburg Pike
Falls Church, VA 22041-3803
1-800-358-2104 or 703-358-2104

Type of Activity

EXPORT/RE-EXPORT/IMPORT/INTERSTATE AND FOREIGN COMMERCE/TAKE OF ANIMALS (LIVE/ SAMPLES/PARTS/PRODUCTS) under the Convention on International Trade in Endangered Species (CITES) and/or the U.S. Endangered Species Act (ESA)

Complete Sections A or B, and C, D, and E of this application. U.S. address may be required in Section C, see instructions for details. **Instructions on how to make your application complete and help avoid unnecessary delays are attached.**

Section A: Complete if applying as an individual

1.a. Last Name	1.b. First Name	1.c. Middle Name/Initial	1.d. Suffix
Rosenbaum	Marieke	H	

2. Date of Birth (mm/dd/yyyy)	3. Telephone Number	3.a. Alternate Telephone Number	4. E-mail address
	[redacted]		Marieke.Rosenbaum@tufts.edu

Section B: Complete if applying on behalf of a business, corporation, public agency, Tribe, or institution

1.a. Name of business, agency, Tribe, or institution	1.b. Doing business as (DBA)
Tufts University Cummings School of Veterinary Medicine	

2. Tax identification no.	3. Description of business, agency, Tribe, or institution

4.a. Principal officer Last name	4.b. Principal officer First Name	4.c. Principal officer Middle name/initial	4.d. Suffix
Rosenbaum	Marieke	H	

5. Principal officer title	6. Primary contact name
	Marieke Rosenbaum

7.a. Business telephone number	7.b. Alternate telephone number	7.c. Business fax number	7.d. Business e-mail address
617-605-9089			Marieke.Rosenbaum@tufts.edu

Section C: All applicants complete address information

1.a. Physical address (Street address; Apartment #, Suite #, or Room #; no P.O. Boxes)
200 Westboro Road, Building 20, Room 210, Runstadler Lab

1.b. City	1.c. State	1.d. Zip code/Postal code	1.e. County/Province	1.f. Country
North Grafton	MA	01536		USA

2.a. Mailing address (include if different than physical address; include name of contact person if applicable)

2.b. City	2.c. State	2.d. Zip code/Postal code	2.e. County/Province	2.f.Country

Section D: All applicants MUST complete

1. Attach the **nonrefundable application processing fee** in the form of a check or money order payable to the U.S. FISH AND WILDLIFE SERVICE **in the amount of $100.** Federal, Tribal, State, and local government agencies, and those acting on behalf of such agencies, are exempt from the processing fee – *attach documentation of fee exempt status as outlined in instructions* [50 CFR 13.11(d)].

2. Certification: I hereby certify that I have read and am familiar with the regulations contained in ***Title 50 Part 13 of the Code of Federal Regulations*** and the other ***applicable parts in subchapter B of Chapter I of Title 50***, and I certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

Signature of applicant/Principal Officer for permit (No photocopied or stamped signatures) Date of signature (mm/dd/yyyy)

9/30/2019

Please continue to next page

E. EXPORT/RE-EXPORT/IMPORT/INTERSTATE AND FOREIGN COMMERCE/TAKE OF ANIMALS (Live/samples/parts/products) (CITES and/or ESA)

Allow at least 90 days for the application to be processed. Applications for endangered species permits must be published in the Federal Register for a 30-day public comment period.

Complete all questions on the application. Mark questions that are not applicable with "N/A". If needed, use separate sheets of paper. On all attachments or separate sheets you submit, indicate the application question number you are addressing. If you are applying for multiple specimens, be sure to indicate which specimen you are addressing in each response.

NOTE: The import of live southern white rhinoceros from South Africa and Swaziland must meet specific CITES criteria for an import permit to be issued. If you are requesting authorization for the import of these species, please ensure that you respond to question 14 below.

Electronic submission of inventories, photographs, and receipts: Some applications contain extensive inventories and /or a large number of photographs or receipts. You may provide electronic versions of the documents. Such a submission will assist the processing of your application since it may reduce data entry by the U.S. Fish and Wildlife Service. If you wish to provide information electronically, once you have received an application number via the e-mailed acknowledgment letter, e-mail your information to Permits@fws.gov. Be sure to include the application number provided in the acknowledgment e-mail that will be sent to you when we receive your application.

☐ I will be submitting documents electronically.

1. Name and address where you wish the permit to be mailed, **if different from page 1**. If you would like expedited shipping, please enclose a self-addressed, pre-paid, computer-generated, courier service airway bill. If unspecified, all documents will be mailed via regular mail through the U.S. Postal Service.

2. Who should we contact if we have questions about the application (name, phone number, and e-mail)?

   Marieke Rosenbaum, 617-605-9089, marieke.rosenbaum@tufts.edu

3. Have you or any of the owners of the business (if applying as a business, corporation, or institution), been assessed a civil penalty or convicted of any criminal provision of any statute or regulation relating to the activity for which the application is filed; been convicted, or entered a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act; forfeited collateral; OR are currently under charges for any violation of the laws mentioned above?

   ■ No ☐ Yes

   If you answered "Yes" to Question 3, provide: a) the individual's name; b) date of charge; c) charge(s); d) location of incident; e) court, and f) action taken for each violation. Please be aware that a "Yes" response does not automatically disqualify you from getting a permit.

4. What activity are you requesting authorization to carry out (Indicate appropriate activities):

☐ EXPORT ☐ RE-EXPORT ☑ IMPORT ☐ TAKE (e.g., cull, lethal harvest)
☐ INTERSTATE COMMERCE ☐ FOREIGN COMMERCE

Note: Interstate Commerce permits authorize the sale of endangered and threatened species across State lines, but only for activities that will contribute to enhancing the propagation or survival of that species. Interstate commerce activities with wildlife require the buyer to obtain a permit prior to the sale or offer for sale.

5. For **EACH** animal/specimen involved in the proposed activity provide:

a. Scientific name (genus, species, and, if applicable, subspecies)	**b. Common name**	**c. Birth/ Hatch Date** *(mm/dd/yyyy)* (approximate of actual unknown)	**d. Wild or captive-born**	**e. Quantity**	**f. Gender** (male or female, if known), if	**g. Permanent markings**, if alive (e.g., tattoo, ID #, microchip #, scars)	**h. Type of sample or product** (e.g., blood, tissue, DNA)
EXAMPLE: *Pan troglodytes*	Chimpanzee						
Provided as separate document							
Provided as separate document							
Provided as separate document							
Provided as separate document							

6. The current location of the specimen(s) (address and country):

Name: Laboritorio de Epidemiologia Molecular Genetica
Address: Instituto de Medicina Tropical, Universidad Nacional Mayor de San Marcos
City: Calle German Amezaga N 375
State/Province: 15081 Lima, Lima Peru
County, Postal Code:

7. Recipient/Sender:

- If **export**, provide name and address of the recipient in the foreign country.
- If **re-export**, provide the name and address of the recipient in the foreign country.
- If **import**, provide name and address of the exporter in the foreign country.
- If **interstate or foreign commerce**, provide name and address of the proposed seller/supplier.

Name: Laboritorio de Epidemiologia Molecular Genetica
Address: Instituto de Medicina Tropical, Universidad Nacional Mayor de San Marcos
City: Calle German Amezaga N 375
State/Province: 15081 Lima, Lima Peru
County, Postal Code:

SOURCE OF SPECIMEN (answer question 8 or 9 for **EACH** animal/specimen involved, as appropriate).

8. For captive-bred animals or animal(s) from which the specimen(s) are/were obtained, provide a signed and dated statement from the breeder that includes the following:
   a. Scientific name (genus, species, and, if applicable, subspecies) and common name;
   b. Name and address of the facility where the animal was bred and born;
   c. Birth/hatch date (mm/dd/yyyy), and, if applicable, identification information;
   d. Location (name of facility, address, city, State, postal code) of parental stock;
   e. A statement that the animal was bred at the above facility;
   f. Documentation demonstrating the history of transactions (e.g., chain of custody or ownership of the animal).
9. For **EACH** animal/specimen **taken from the wild**, provide the following:
   a. Scientific name (genus, species, and, if applicable, subspecies) and common name;

Included in separate spreadsheet provided.

   b. Specific location of where, when, and by whom (name and address) the specimen was removed from the wild;

See attached document.

   c. Purpose of removal and length or approximate length of time held in captivity. Discuss issues such as the method of collection, was the collection done as part of a larger study, were animals returned to the wild after sampling, and did any mortalities or injuries occur due to collection or holding;

See attached document.

   d. If and how any remuneration, either financial or in-kind, was provided for taking or capturing animals or for the collection of samples.

N/A

   e. Your efforts to use captive specimens (e.g., captive-born, captive-held), or parts thereof, in lieu of taking animals from the wild.

See attached document.

   f. Copies of your foreign or domestic collecting permit, license, contract or agreement;
   g. Documentation showing that the specimen(s) was/were legally obtained by the applicant; and
   h. Copies of any applicable State, Tribal, Federal, or Foreign government permits or licenses that authorized the removal of this animal from the wild.

JUSTIFICATION FOR REQUESTED ACTIVITY.

10. Provide a detailed statement justifying the proposed activity, particularly the following:

a. Describe the purpose of your proposed activity. For example, if the purpose is scientific research, attach a copy of your research proposal outlining the purpose, objectives, methods (e.g., specific information on survey/collection methods, sampling regime, equipment to be used), and whether similar work has already been done or is currently being done. If the purpose includes conservation education, provide copies of educational materials (e.g., handouts, text of signage or public presentations), and include the purpose and objectives of the proposed activity. If the purpose is for propagation for conservation purposes (including culling as part of herd management), provide a description of how the species will be propagated and the disposition of progeny, as well as long-term goals of the breeding program, how the breeding program is managed to maintain genetic vitality, and information on any cooperative breeding programs or agreements that are/will be established, including any future plans for re-introduction.

See attached document.

b. Description of the technical expertise of each person (please also include CV or resume), as it relates to the proposed activities. If the proposed activity involves live animals, include the experience of each animal caretaker working with the species.

All samples are collected by veterinarians. See attached document.

c. Copies of contracts, agreements or other documents that identify persons involved and dates of activities for which authorization is being requested.

11. A statement on how the activities will **enhance or benefit the wild population** (e.g., in-situ and ex-situ projects).

See attached document.

12. If live specimens are to be held in captivity as part of the proposed activity:

a. Provide a detailed description (e.g., size, construction materials, protection from the elements) and photographs or diagrams (no blueprints, please) clearly depicting the existing facilities **where the wildlife will be maintained**. If the specimens will be housed at multiple facilities, either immediately or within the next year, provide a full description of each facility. If you are unsure of which facilities may be receiving specimens (e.g., final decisions on placement have not been made), please indicate likely candidates and the mechanism that will be used to determine recipient facilities;

N/A

b. A statement of the specific technical experience of CV or resume available to the recipient(s) for maintaining and propagating live specimens of the same or similar species;

N/A

c. The number of years each species has been maintained at the facility;

N/A

d. The number of births by year for each species for the last 5 years; and

N/A

e. Mortalities at the facility with these or similar species in the last 5 years, causes of such mortalities, and steps taken to avoid or decrease such mortalities.

N/A

IMPORTS, EXPORTS, OR RE-EXPORTS.

13. For shipment of LIVE specimens, the transport conditions for animals must comply with the CITES Guidelines for Transport of Live Animals or, in the case of air transport, with the International Air Transport Association (IATA) live animal regulations (contact airline for information). As such, describe:

a. The type, size, and construction of any shipping container; and

N/A

b. The arrangements for watering or otherwise caring for the wildlife during transport.

N/A

14. For import of live southern white rhinoceroses from South Africa and Swaziland, a determination that the importing facility meets the CITES "appropriate and acceptable destination" annotation must be made. Therefore, provide written documentation demonstrating that the proposed activity would promote *in situ* conservation of the species. **Note:** ***For any permit authorizing trade of live rhinoceroses under an "appropriate and acceptable destination" annotation, the rhinoceros horn from these animals may not enter commercial trade and the animal may not be sport hunted.***

15. **For import of LIVE CITES Appendix-I listed marine mammal species**, provide a copy of your FWS or NOAA Fisheries permit or authorization.

16. For import of CITES **Appendix-I listed species**, provide information to show the import is not for primarily commercial purposes as outlined in Resolution Conf. 5.10 .

17. For export of CITES **Appendix-I listed species**, provide a copy of the CITES import permit, or evidence one will be issued by the Management Authority of the country to which you plan to export the specimen(s). In accordance with Article III of the CITES treaty, it is required that import permits are issued before the corresponding export permit.

18. If the specimen is being **re-exported** (e.g., exporting a specimen that was previously imported into the United States), provide:

    a. A copy of the canceled CITES export or re-export document issued by the appropriate CITES office in the country from which the wildlife was imported (if applicable); and

    b. A cleared copy of Form 3-177, wildlife Declaration for Import (hard copy or electronic release); **OR**

    c. If you did not make the original import, provide a copy of the importer's documents outlined above and the invoice or other documentation that shows you acquired the wildlife from the original importer or history of transactions which demonstrate chain of ownership.

All international shipment(s) must be through a designated port. A list of designated ports (where an inspector is posted) is available. If you wish to use a port not listed, please contact the Office of Law Enforcement for a Designated Port Exemption Permit (form 3-200-2).

9. b. No live animals were removed from the wild for the purposes of this research. Saliva samples were collected non-invasively from free-ranging wild primates in Puerto Maldonado. Wild primates were not placed into captivity for the purposes of this research. Captive primates at sanctuaries and rescue centers were sampled from Taricaya Rescue Center and Centro de Rehabilitatcion y Conservacion de Animales Silvestres (CRCAS) where wild individuals are temporarily held for rehabilitation and eventual release. Samples were collected by Dr. Marieke Rosenbaum of the Cummings School of Veterinary Medicine at Tufts University (200 Westboro Road, North Grafton, MA 01536) and by Dr. Patricia Mendoza of Neotropical Primate Conservation (Av. Sergio Bernales 189 Lima34, Peru) and of the University of Saint Luis, Missori.

9. c. Any animals in captivity at the time of the research were already housed at the rescue centers mentioned in 9.b. and were not placed in captivity for the purposes of this research. Captive animals were anesthetized for collection of blood and saliva (via oral swab), and fecal samples were obtained from the ground or via extraction while anesthetized.
All free-ranging wild animals were only sampled non-invasively for saliva and feces, and were not held in captivity for any length of time.

9. e. Captive individuals housed at the rescue centers mentioned in 9.b. were used for sampling to the fullest extent possible. Free-ranging wild individuals were sampled non-invasively and were not captured or placed in captivity for the purposes of this research.

10. a. The purpose of sample collection is scientific research on infectious and zoonotic disease (e.g. Herpesvirus, Influenza viruses, Zika virus, and general viral diversity) and optimizing sample collection techniques in wild and trafficked primates in Peru. Transmission of infectious diseases can occur between humans and primates, and zoonotic diseases of human importance have been anecdotally reported in Peru. This research aims to determine the prevalence of such pathogens in wild Peruvian primates that have had potential contact with humans via wetmarkets, tourist attractions, captive rehabilitation, and habitat encroachment.

10. b. All samples are collected by Dr. Marieke Rosenbaum and/or Dr. Patricia Mendoza who are both veterinarians with 8+ years working with Neotropical primates. Both CVs are included in this permit application.

11. Zoonotic infectious diseases, such as Herpesvirus and Tuberculosis, pose a serious survival risk to wild primates and can be transmitted via human contact. In Peru, thousands of trafficked primates are placed in captive rehabilitation facilities annually after being abandoned or confiscated, exposing them to humans and potentially to zoonotic pathogens. While infections with organisms such as Herpesvirus can cause fatal disease in primates, overwhelmed rehabilitation facilities typically do not conduct pre-release health screenings with specific testing for zoonotic diseases. While exposure to human infectious disease can lead to decreased survival and/or release eligibility of individual trafficked and rehabilitated primates, it can also lead to transmission of disease to immunologically naive wild populations, threatening overall population health and potentially serving as a reservoir for human disease.

This research aims to benefit wild primate populations by determining (1) the prevalence of infectious disease amongst wild and rehabilitated primates, (2) more effective methods of disease detection and prevention in rehabilitated primates, and (3) potential methods of preventing disease transmission from released primates to wild groups.

16. The importation of the requested Appendix-I samples is not for commercial purposes as outlined in Annex b of the Resolution Conf. 5.10. The Cummings School of Veterinary Medicine is an academic institution and Dr. Rosenbaum a veterinary researcher. The purpose of the import is for scientific inquiry only and resale or commercial exchange of the specimens will not occur.

DISEASE RISK OF REINTRODUCING PRIMATES CONFISCATED FROM THE ILLEGAL WILDLIFE TRADE

Patricia Mendoza

Marieke Rosenbaum

2019

PROJECT SUMMARY

Wildlife trafficking is a major threat to species conservation. As a consequence of this activity, millions of live animals are removed from the wild and translocated through rural and urban environments to supply the pet trade. These trafficked animals carry with them the components of their microbiome, including potentially pathogenic organisms that may circulate in their natural environments. In captivity, they interact in close contact with individuals of different species and populations, including humans and domestic animals. As a result of these interactions animals are exposed, and expose others, to the infectious agents they carry.

Primates are the most frequently traded mammal taxa in Peru. Among trafficked species, the phylogenetic proximity of monkeys to humans, to whom they are constantly exposed in captivity, increases their risk of acquiring zoonotic infections. Therefore, after confiscation, their return to the wild carries the risk of introducing human disease into susceptible wild primate populations. Several infectious agents, zoonotic and non-zoonotic, have been identified in captive primates in Peru. Among these agents, human herpesvirus has been detected in primates housed at zoos and rescue centers, causing from asymptomatic to lethal infections. There is little information about the circulation of infectious agents in primate populations of the Peruvian Amazon, and the presence of human herpesvirus in wild primates is currently unknown.

Herpesviruses have coevolved with their animal hosts. Infections in their natural reservoir are usually benign but can be highly pathogenic when the virus is transmitted from adapted to non-adapted species. Thus, the introduction of these viruses, especially human herpesviruses, is a potential hazard of primate reintroductions.

Animal reintroductions carry an intrinsic disease risk. However, this should not preclude the return of animals to the wild if the risks are known and can be properly managed to reduce their impact. Current efforts for primate reintroductions in Peru provide an ideal system to study the disease risks of animal reintroductions: primates are unfortunately abundant within the wildlife traffic network, captive populations currently are established in rescue centers, circulation of pathogens in these populations is well described, and reintroductions are ongoing and under monitoring.

The goal of this research is to fill in the gaps in the knowledge of disease risks associated with wildlife trafficking and the reintroduction of rehabilitated primates in the Peruvian Amazon. To achieve this, we will first describe the problem of wildlife trafficking in the country, then identify the disease hazards of primate reintroductions, and finally use Herpesvirus as a model agent for targeted disease risk assessment.

To fully describe the problem of wildlife trafficking in Peru, we will retrospectively analyze data from a large-scale wildlife trafficking study performed in Peru between 2007-2012. Although several years have passed since data collection, these data are unique in sample size, geographic coverage and timescale. Using these data, we will estimate the abundance of species affected by wildlife trafficking in Peru, assess the similarity between animal markets across the country, and describe the dynamics of wildlife trade in Peru.

To identify the disease hazards of primate reintroductions, we will first compile the available information about infectious agents detected in primates in the Peruvian Amazon. Most of this

information is contained in a database produced by a health survey of captive primates carried out between 2010-2012. We propose to use this database to assess the risk factors of disease transmission in captivity. To complement this information, we will collect samples from captive and wild primates and use a metagenomic approach to assess the differences in viral circulation.

Finally, using Herpesvirus as a model agent for targeted disease risk assessment, in my third chapter we will use a consensus PCR to describe herpesvirus diversity circulating in captive and wild primates. With this information, we will seek evidence of cross-species transmission of primate herpesviruses in captivity. Herpesvirus infections are usually undetected because of latency and intermittent shedding, but viral shedding is increased if infected individuals are stressed or immunosuppressed. Knowing the herpesvirus infection status, we will also explore a possible correlation between viral shedding, stress and immunosuppression.

DISEASE RISK OF REINTRODUCING PRIMATES CONFISCATED FROM THE ILLEGAL WILDLIFE TRADE

INTRODUCTION

Peru is one of the most biologically diverse countries in the world. Unfortunately, such diversity attracts wildlife trafficking, and many species are illegally hunted and traded to supply the demand for pets, bushmeat and souvenirs (1,2). Primates are the most common mammals in the pet trade (3,4). As a consequence, they are frequently confiscated and placed in captive facilities to wait for one of three possible outcomes: 1) a return to the wild, 2) permanent captivity, or 3) euthanasia (5). There is no public information about the number of animals that are successfully rehabilitated and released, but it is estimated to be the most infrequent result. To return primates to the wild requires a rehabilitation process involving behavioral, ecological, genetic and health assessments to maximize their chances of survival and minimize the impact on the receiving population (6). A critical point in this process is to ensure the animals do not pose an epidemic risk for wild populations.

Animal husbandry associated with trafficking involves high densities, mixing species, poor nutrition, poor hygiene and constant stress – conditions that have the potential to impair immunity and favor disease transmission (7–9). Trafficked animals are also of diverse origin and are forced into interspecific interactions that may not be observed in nature, exposing them to novel agents of disease (7,10). Thus, through the trafficking network, these animals can: (1) be carriers of infectious disease that they introduce into new areas (11,12); (2) get infected by disease agents common to humans (13–15), domestic animals (10,16) and other wildlife (17); and (3) spread acquired diseases into new hosts and susceptible populations (18). Several publications have discussed the potential of wildlife trafficking for disease emergence (7,10,19,20) and infectious diseases have been reported in trafficked animals in many instances (21,22). Of particular relevance, interspecific interactions occurring within the trafficking network have favored opportunistic pathogens with multi-host dynamics to emerge at these settings (9). As noticeable examples, the frequent recombination and multiple host shifts of coronavirus between animals of diverse origin led to the emergence of severe acute respiratory syndrome (SARS CoV) in animal markets of China (17,23); and the contact between prairie dogs and imported African rodents infected with Monkeypox initiated the first human outbreak of the disease in the Western Hemisphere (24). In Peru, zoonotic agents such as Herpes Simplex Virus (25), Simian Foamyvirus (26), mycobacteria (27), *Plasmodium spp.* (28), *Trypanosoma sp.* (29), and antimicrobial resistant bacteria (30) circulate among captive monkeys. Nonetheless, the risk of these infectious agents spreading back to other primates and the burden of disease they may cause in wild populations remain unknown.

Primate translocations carry an intrinsic risk of disease introduction into wild populations. Because of their phylogenetic proximity with humans, primates in captivity are susceptible to acquiring human pathogens that are foreign to their natural habitats (15). Human pathogens can be lethal to wild primates. For example, human respiratory syncytial virus, human metapneumovirus, *Streptococcus pneumoniae*, *Pasteurella multocida*, *Mycobacterium tuberculosis* complex (MTBC) and antimicrobial-resistant *Streptococcus aureus* have been associated with mortality in great apes exposed to humans (31–36). Of particular interest, human herpesvirus has caused outbreaks with high mortality in synanthropic marmosets (15,37,38) and caused the death of Neotropical primates (39–43) and great apes (15) in captivity.

Herpesvirus have coevolved with species that have become their natural host. They are benign in their natural host, but of variable pathogenicity for less adapted species (44). For example, *Herpesvirus ateles* and *Herpesvirus saimiri,* naturally occurring in spider and squirrel monkeys, respectively, can cause lymphoproliferative tumors in owl monkeys, marmosets, and tamarins (45–47). Similarly, human herpes simplex virus (HSV) is lethal for Neotropical primates (40,48–50). In Peru, mortality due to herpesvirus has been reported in an abandoned pet howler monkey (42) and owl monkeys exposed to a confiscated animal (41). However, most cases observed in captivity remain unreported due to difficult access to diagnostic tests (*per. obs.).* A cross-sectional study found that 15% of the monkeys in captive facilities across the country were infected with herpesvirus, and detected the presence of *Herpesvirus ateles* and HSV (25). Considering the potential lethality of herpesviruses after cross-species transmission, that they currently circulate in captive primates in Peru, and that lethal cases have been reported in association with trafficked animals; herpesvirus is an identified hazard of major concern for primate reintroduction efforts in Peru.

From a precautionary perspective, primates that test positive to herpesvirus are not authorized for release (Raul Bello, pers. comm.). However, there are serious pitfalls in a proper risk assessment of herpesvirus introduction through primate reintroductions in Peru. First, screening of captive primates is currently performed through serological tests designed to detect HSV1 and HSV2. Although serological cross-reactivity can occur, it is possible that HSV-seronegative animals are infected by other herpesvirus species (51). Second, there are no reports of herpesvirus circulation in wild primates in Peru. Without such information, the hazard of novel herpesvirus introduction to wild populations cannot be estimated (52,53). Third, the impact of herpesvirus for receptive populations depends on the viral species carried by translocated primates and the free-ranging species exposed to them. Therefore, there is an urgent need for more information about herpesvirus circulation in the context of primate reintroductions to properly assess and manage the risk to wild primates.

This research seeks to fill in the gaps in the knowledge of disease risks associated with wildlife trafficking and the reintroduction of rehabilitated animals in the Peruvian Amazon. We propose to achieve this by focusing on the following objectives:

1. To identify the disease hazards of primate reintroductions in Peru.

2. To determine the extent of herpesvirus circulation in captive Neotropical primates in Peru.

MAIN RESEARCH QUESTION: Does the reintroduction of trafficked and rehabilitated monkeys pose a health risk for wild primates?

Hazard identification: Infectious disease agents in the context of primate trafficking and rehabilitation in Peru.

International guidelines for translocations acknowledge that every animal reintroduction carries a disease risk (6). However, proven carriage of infectious pathogens should not preclude the return of animals to the wild, if their value for species conservation can outbalance the risks (77).

Best practices for animal translocations involve disease risk analysis to scientifically guide decision-makers (6,78). Wildlife disease risk analysis (DRA) consists of four steps: hazard identification, risk assessment, risk management and risk communication (79). Hazard identification builds the analysis by listing all the infectious agents that may be encountered along the process of translocation and could produce adverse consequences. Once identified, hazards can be prioritized according to their importance and potential impact on population health (80). The translocation pathway involves six previously described types of hazard: source, destination, carrier, transport, population and zoonotic hazards (52,81). In the context of primate reintroductions in Peru, some of these hazards can be approached through the current knowledge of pathogens detected in trafficked and captive primates. However, the scarce information about infectious agents circulating in wild primates limits the disease risk assessment of translocations by preventing: 1) the identification of destination hazards, or those agents for which translocated animals are naïve and could reduce their potential for survival, 2) the prioritization of agents that are foreign to receptive populations and could be introduced through translocations, and 3) the identification of population hazards, or those agents that are not novel to receptive populations but can challenge their sustainability by disturbing epidemiological cycles (52,80,81).

The Amazon basin is one of the richest regions for Neotropical primate species diversity, yet this area is underrepresented in the research of primate infectious disease ecology (82). Such is the case of Peruvian Amazon, a region inhabited by more than 51 primate species (http://www.primate-sg.org/primates_of_peru/). There are only 20 publications listed in the Global Primate Parasite Database reporting macroparasites of wild primates between 1964 and 2017 in Peru, none about virus, bacteria and fungi (https://parasites.nunn-lab.org)(83). In contrast, the survey of primates at wetmarkets, zoos, rescue centers and households between 2009 and 2012 detected the circulation of several zoonotic agents including viruses (25,26), hemoparasites (28,29), mycobacteria (27), enteric bacteria (84) and enteroparasites (85) in captive primates in Peru. Without data from wild primates, it remains uncertain if the agents detected in captive primates come from source populations or were acquired in captivity. As established before, this lack of information limits the identification of hazards for primate reintroductions. Furthermore, prioritization of hazards would require a better understanding of the risk factors that contribute to pathogen sharing and could lead to spillovers.

We aim to identify the hazards of primate reintroductions in Peru by 1) listing infectious agents that could be present along the translocation pathway, 2) assessing risk factors for pathogen sharing at critical points of the translocation process, and 3) identifying changes in microbial diversity in captive primates.

First, we will compile a comprehensive list of infectious agents detected in primates in the Amazonian region through an exhaustive review of the literature.

Second, we will summarize the data on infectious agents detected in captive primates surveyed between 2009-2012 in Peru to assess risk factors that influence the infection status of primates recovered from wildlife trafficking. Wildlife trafficking, wet markets and pet keeping have been previously implicated in outbreaks resulting from the inter-specific transmission of infectious agents, especially zoonotic pathogens (10,87,88). The main feature of trafficking involved in disease transmission is that it provides the opportunity for pathogen sharing between species or individuals that would not interact in the wild (10). Most infectious agents reported in primates are able to infect more than one host (89). But which are the species more likely to share these pathogens? It has been demonstrated that the most important factors for pathogen sharing between primate species are phylogenetic distance and geographic overlap (89–91). In the wild, co-occurrence (i.e. geographic overlap) would determine exposure of one species to another, but also to similar environmental and ecological conditions. In captivity, these conditions are set by anthropogenic action, as for example, husbandry practices and the level of exposure to humans in wet markets, zoos, rescue centers and households. We hypothesize that the genus and location of the primates surveyed in captivity are associated with their infection status; hence, phylogeny and co-occurrence will influence the probability of pathogen sharing between primates. We also hypothesize that the risk of zoonotic infection varies among the different captive settings in which the animals were sampled. Testing these hypotheses would help to understand the diversity of zoonotic agents found in captive primates and could be a first step to predict the infectious risk of animals rescued at a specific location.

Finally, we will use a metagenomic approach to characterize the shedding of infectious agents by wild and captive primates, as a first assessment of the multi-host multi-pathogen system that emerges within the primate trafficking and rehabilitation context. Trafficking brings together animals from different populations and species, under conditions that favor the transmission of infectious agents (i.e. stress, immunosuppression, high density, high frequency of contact). In addition, transmission of zoonotic agents may occur as a result of the constant exposure to humans during capture, transport, trade, rescue and rehabilitation (86). We hypothesize that the greater exposure to humans and other animals in captivity results in a higher diversity of infectious agents harbored by captive primates when compared with their wild relatives. We predict that microbial diversity will be higher in trafficked primates than in wild individuals because of a broader opportunity of contact between primate species during transport and sales at markets. It is important to note that other physiological and pathological processes may influence an individual's microbiomes resulting in dysbiosis (i.e. altered or reduced microbial diversity) regardless of the level of exposure. This survey will focus on a single species, the Peruvian spider monkey (*Ateles chamek*) to avoid variations in pathogen susceptibility between species. *A. chamek* provides good opportunities for this research: it is frequently trafficked and confiscated, there are at least two captive populations currently at rehabilitation centers, and at least one group has been successfully reintroduced and is currently under monitoring. There is no other primate species that could be surveyed across the entire translocation pathway in Peru.

Is the diversity of infectious agents shed by monkeys altered in captivity?

Methods - Detecting shifts in primate-associated microbial diversity in captivity

Study area. Peru, country level.
Study population. Peruvian Neotropical primates

Study design. Cross-sectional comparative survey. We will survey and compare the microbial diversity of captive and wild monkeys. To capture the variability among different captive settings, captive individuals will be samples among 4 instances reflecting the translocation pathway from trafficking to reintroduction. The resulting 5 comparison groups and their inclusion criteria are:

1) For sale. Monkeys found at a wet market or for sale at any location,
2) Confiscated. Monkeys recently confiscated or rescued from wildlife trafficking, within 7 days of arrival to a rescue center or administrative office,
3) In Rehabilitation. Monkeys housed at a rescue center for at least 30 days after confiscation,
4) Released. Rehabilitated and released free-ranging monkeys after 3 months of their release date,
5) Wild. Free-ranging monkeys that have never been captive.

Samples collection. Saliva would be collected from oral swabs, from chewing ropes provided to captive and free-ranging animals, and from chewed leaves and fruit dropped by free-ranging primates. Fecal samples will be collected from the fresh droppings of captive and free-ranging primates. Saliva and fecal samples will be preserved using a nucleic acid stabilizing solution within four hours of collection in the field.

Lab analysis. DNA and RNA extraction will be performed on site. To characterize the shedding of respiratory viruses, saliva samples will be enriched for viral recovery and analyzed by shotgun sequencing. To characterize fecal shedding, fecal samples will be analyzed by 16S rRNA sequencing. Both sequencing procedures will be performed using a portable next-generation sequencer (Nanopore MinIon) and/or Illumina platforms.

Data analysis. After taxonomic identities are obtained from sequence reads, within-samples diversity will be calculated using Shannon and Simpson indexes, and between-samples diversity will be estimated using Bray-Curtis dissimilarity and UniFrac distances. The relative abundance of viral taxa in captive and wild monkeys, and between captive groups will be compared using a Dirichlet-Multinomial model, diversity indexes will be compared using a Kruskal-Wallis test and a PCA will be built using UniFrac distances.

Targeted disease risk assessment: Herpesvirus circulation in captive and wild Neotropical primates in Peru.

Herpesviridae is a viral family that encompasses about 130 viruses (44,93). Most of these viruses have coevolved with species that have become their natural host (93). The group of herpesvirus (HV) that are isolated from amniotes originated around 400mya and diverged in 3 monophyletic subfamilies: *Alphaherpesvirinae*, *Betaherpesvirinae* and *Gammaherpesvirinae* (93). The 37 herpesvirus isolated from primates are spread across the 3 subfamilies, and include 8 virus that have humans as their natural host (94). HV cause light to mild infections at the first entrance in their healthy natural host, but most infections remain asymptomatic on them (95). In other than their natural host, HV cause variable pathology including exanthematous disease (e.g. varicella zoster virus), inflammatory disease (e.g. cytomegalovirus), mononucleosis (i.e. Epstein-Barr virus), neurological disease (e.g. B virus) and lymphoproliferative tumors (e.g. rhadinoviruses) (96). After primary infection HV develop latency, being able to remain in the host without causing any symptoms for a lifetime or until conditions like stress or immunosuppression are favorable for reactivation (97).

The outcome of HV infections in primates vary depending on the individual's immune response, the primate species, and the viral strain involved (95,96,98). Within *Alphaherpesvirinae*, the genus *Simplexvirus* includes the most well-characterized and widespread herpesviruses of humans: Herpes Simplex Virus (HSV) type 1, of salivary excretion, which affects up to 67% of adult humans (WHO 2017), and HSV2, a sexually transmitted virus circulating in approximately 11% of the sexually active human population (99). HSV1 is known to cause high morbidity and mortality among Neotropical primates such as capuchins, owl monkeys, and marmosets (40,43,50,100). Numerous reports suggest instances where trafficked, pet, zoo, or breeding colony primates acquired HSV1 infections from their human caretakers. Outbreaks in wild populations of marmosets in close proximity to human populations have been documented (15,38,40,48,49). *Saimiriine herpesvirus 1,* the alphaherpesvirus of squirrel monkeys, can cause generalized multifocal internal organ necrosis and mortality with neurological symptoms in owl monkeys, marmosets, and tamarins (38,45,95). Within *Gammaherpesvirinae* and the genus *Rhadinovirus*, Herpesvirus ateles (HVA) and Herpesvirus saimiri (HVS), which occur naturally in spider and squirrel monkeys, can cause lethal lymphoproliferative disease, including T-cell lymphomas and leukemia in marmosets of the genus *Saguinus sp.* and *Callithrix spp.* (46). The Lymphocryptovirus, also gammaherpesvirus, can have oncogenic effects in healthy and immunocompromised individuals, such as the tumors caused by Epstein-Barr virus (EBV) (i.e. Burkitt's lymphoma, nasopharyngeal carcinoma and B-cell lymphoma) and the Kaposi sarcoma (HHV8) in humans, as well as lymphoproliferative carcinomas in marmosets (94,101). In contrast, *Betaherpesvirinae*, which include the primate cytomegaloviruses, are usually asymptomatic and more often cited as a co-factor of human disease but infect over 90% of their natural host populations.

The extensive available information about herpesvirus in humans and other primates illustrate that: 1) herpesviruses are often highly prevalent in their natural host, 2) cross-species transmission is common, and 3) cross species transmission usually results in higher pathogenicity in the affected species. Monkeys are repeatedly exposed to humans and other primates through the trafficking network. Thus, the opportunity for herpesvirus transmission through interspecific contact in these settings must be high. The first attempt to describe herpesviral circulation in captive Neotropical primates in Peru was done by Ghersi et al. (2011). They found a 15% prevalence in blood samples from asymptomatic monkeys (n=144), identifying HSV1 and HVA among other

strains that remain uncharacterized (25). However, this was a cross-sectional opportunistic study that may have underestimated the real prevalence because of their limited ability to detect latent infections and infections with low viremia.

HV detection is usually limited due to the diversity of viruses encompassed in this family, their variable symptomatology, their ability to develop latency and their intermittent excretion. Monoclonal antibodies used for the serological diagnosis of HV infections are very specific to the epitopes that trigger the immune response; however, as many epitopes are common to more than one type of HV, cross-reactivity is frequent (95). Viral detection in blood is possible during viremia, active or recurrent infection, but limited in individuals with latent infections (102,103). Viral excretion is also intermittently observed in saliva in individuals with active or recurrent infection, those that are immunosuppressed, and in a small percentage of those with asymptomatic infections (104). The use of multiple techniques and repeated sampling increases detectability of HV upon reactivation and in cases of intermittent shedding (103,105).

We propose to build a 2-year longitudinal study to assess herpesvirus circulation and interspecific transmission in 2 species of Neotropical primates in captivity in Peru. For this, we will follow 2 cohorts of captive and 2 cohorts of free-ranging monkeys and perform repeated surveys to attempt HV detection in multiple samples. We hypothesize that the exposure of trafficked monkeys to humans and other primates results in the interspecific transmission of multiple HV strains. We predict that diverse herpesvirus species, in addition to HSV1 and HVA, currently circulate in captive monkeys at rescue centers in Peru. We also predict that HV species will be found at higher prevalence in their natural host (e.g. Herpesvirus ateles in spider monkeys) but at lower prevalence in other species.

As described above, HV are difficult to detect. Then, to properly describe HV circulation it is important to assess the factors that may influence HV detection. We will simultaneously collect saliva and blood samples from captive animals to assess the correlation between viremia and salivary shedding. HV infections last for a lifetime, thus a single detection in any sample indicates a permanent HV-positive status. However, HV shedding only occurs during active infection, upon reactivation or in asymptomatic cases with intermittent shedding (102,103). We will use a longitudinal design to increase the probability to detect individuals with intermittent shedding. It will also allow the assessment of risk factors that may influence HV-positive infection status (HV detected in at least one sample) and HV shedding (HV detected in saliva at any given time). Stress is recognized as the main risk factor for the development of herpetic lesions and HV reactivation in humans and experimental primates (106,107). This effect is mediated by the impairment of the immune cellular response caused by stress hormones (107–109). To explore the effect of stress and cellular response in HV shedding, we will measure the levels of fecal cortisol and estimate the neutrophils to lymphocyte ratio in blood samples. If HV status or shedding are mediated by stress, we would expect to find an increase in the levels of cortisol and a shift in the neutrophils to lymphocyte ratio in monkeys that test HV positive.

Does the exposure of captive monkeys to humans and other primates result in interspecific transmission of herpesviruses?

Hypothesis: Captive Neotropical primates carry a diverse range of *Herpesviridae* which is reflective of their exposure to humans and other primates during their time in captivity.

Predictions. (1) HV species will be found at higher prevalence in their natural host (e.g. Herpesvirus ateles in spider monkeys) but at lower prevalence in other species. (2) Human HV will be detected in captive monkeys but not in free-ranging ones.

Methods - Assessing Herpesvirus transmission in captive monkeys

Study area. Tambopata National Reserve buffer zone, region of Madre de Dios, Southern Amazon, Peru. The area has an altitude of 183-500 m.a.s.l, an average temperature of 26C (21-40C), annual rainfall of 1000-2400mm, and a dry season that goes from May to October.

Study sites: For access to captive animals: Taricaya Rescue Center and Amazon Shelter Rescue Center. For access to free-ranging animals: Kawsay Center and Las Piedras Amazon Center. These centers are located in *terra firme* forests on the left margin of the Madre de Dios river and Las Piedras river, respectively, and surrounded by patches of primary and secondary forest.

Study population. Captive and wild individuals of individuals of Peruvian black spider monkeys (*Ateles chamek*) and Red howler monkeys (*Alouatta sp.*).

Study design. This is a longitudinal study and will follow 2 open cohorts of captive monkeys (mixed populations of spider and howler monkeys), 2 cohorts of wild red howler monkeys and 2 cohorts of wild spider monkeys for 2 years. Socio-demographic characteristics of all captive and free-ranging individuals will be recorded at the beginning of the study (i.e. sex, age class, time in captivity, social status, social rank) and re-assessed during the entire length of the study.

Sample size. To confirm the 15% prevalence found by Ghersi et al. (2011), considering a 95% confidence interval, a confidence limit of 5% and the current population in each rescue center (n_1=40, n_2=20), the required sample sizes for site 1 and site 2 are 34 and 19 individuals, respectively. To increase the power for comparisons, we will sample all monkeys at each rescue center and at least 2 wild groups of each species as shown in the following table:

Table 6. Number of individuals at each rescue center and minimum number of individuals to sample at each location

Comparisson group	Site	Current Population	Sample size
Captive	1. Taricaya Rescue Center	40	34
Captive	2. Amazon Shelter	20	19
Wild	3. Kawsay Biological Station	unknown	1-2 groups (*Alouatta sp.* only*)
Wild	4. Las Piedras Biological Station	unknown	1-2 groups (both species)

Samples collection and field processing. To determine HV status and oral shedding, we will collect blood and saliva samples. Blood samples (5ml, or up to 6% of total body weight) will be obtained by venopunction of the femoral vein, placed immediately in collection tubes with EDTA and stored in refrigeration. At least 1 aliquot (0,5ml) will be transferred to a 2-ml cryovial and placed in ultrafreezing in liquid nitrogen tanks within 12h of collection. Saliva samples will be collected by 2 methods: 1) directly from the mouth of captive monkeys through oral swabbing, and 2) by providing polyester ropes (Salimetrics®) soaked in banana juice to captive and free-ranging monkeys. Non-invasive collection (method 2) will follow the procedures described by Evans et al. (2015) (110) and validated in Taricaya rescue Center in Summer 2017(111). Oral swabs will be immediately placed in

vials with RNA Later. Saliva will be eluted from ropes by centrifugation, then the eluted solution will be measured and transferred to vials with a nucleic acid stabilizing solution. Saliva samples will be stored at room temperature for up to one week, then transferred to ultrafreezing. Oral swabs and blood will be obtained under anesthesia once per year. Non-invasive saliva collection will be performed every 3 months during an 18-month period.

Lab analysis. We will test HV shedding in saliva samples in all captive and free-ranging monkeys. We will also test blood and serum samples from all captive animals to detect viremia antibody circulation. Blood and saliva samples will be tested using the consensus PCR developed by Vandevanter et al. (1996) and complemented by Chmielewicz et al. (2001). This protocol targets conserved regions of the genes encoding DNA polymerase (DPOL), terminase (TERM) and glycoprotein B (gB) allowing pan-herpes detection (112,113). Serum samples will be tested using an HSV1/HSV2 IgG/IgM ELISA commercial kit. This assay detects antibodies of acute and chronic phase for the most prevalent human herpesvirus. It would allow to detect silent infections (infected, non-shedding) and to assess the frequency of reactivation of infections caused for these 2 viruses.

Data analysis. HV-positive status will be assigned if a monkey tests positive to PCR in at least one sample over the total length of the study. The prevalence of HV infections for each species and group (captive vs wild) will be estimated as the total number of HV-positive monkeys over the total population samples each year. Incidence and cumulative incidence will be estimated as the number of new positives obtained each year and for the entire length of the study, respectively. All disease rates will be estimated with a 95% confidence interval.

Agreement (repeatability) of results between saliva samples obtained through invasive and non-invasive methods will be estimated using Cohen's kappa.

To assess the relationship between host species and disease rates, we will estimate the relative risk (RR) of being infected (HV status) for each species. We will use a Mantel-Haenszel to test the homogeneity of risk among sex, age class, time in captivity and social rank. To test if the RR of being infected with HV is higher for its natural host, we will use a GLM assuming a Poisson distribution with log link function and adjust by significant confounding variables. An RR > 1 of being infected with HVA in spider monkeys when compared with howler monkeys would confirm my first prediction. The absence of Human HV in wild monkeys or an RR > 1 for captive monkeys when compared to wild monkeys would support my second prediction.

Do stress and immunosuppression increase the likelihood of Herpesvirus shedding?

> **Hypothesis.** HV salivary shedding is associated to a shift in immune response and variations in the levels of fecal glucocorticoids.
>
> **Predictions.** (1) Monkeys that are shedding HV in saliva have a lower neutrophil to lymphocyte ratio than those that are HV negative. (2) Monkeys that are shedding HV have higher levels of fecal glucocorticoids.

Methods - Assessing the relationship of HV shedding with immune response and fecal glucocorticoid (GC) concentrations.

Study area and study sites. Same as above.

Study population. A subset of the population described above corresponding to captive Peruvian black spider monkeys and red howler monkeys hosted at site 1 and site 2.

Study design: This is a longitudinal study and will follow 2 open cohorts of spider monkeys and 2 open cohorts of captive red howler monkeys for 2 years.

Samples collection and lab processing. To assess immune cellular response, blood samples will be collected at least two times, one year apart. Blood smears and hematocrit tubes will be prepared immediately after collection to obtain hematocrit measurement, white blood cell counts and differential counts. To assess reactivity to stress, fecal samples will be collected in 5 different moments: the day animals are anesthetized for samples collection, 3 days before and every of the 3 days after. To assess correlation between steroid concentrations and HV shedding, chewing ropes and fecal samples will be collected at the same time every 3 months. To determine GC concentrations, fecal samples will be collected early in the morning and extracted on the field using the protocol validated by Shutt et al. (2012) and tested in spider monkeys by Rimbach et al. (2013) (114,115). Fecal GC concentrations will be measured using a commercial immunoassay.

Data analysis. HV oral shedding will be determined if a monkey tests positive to PCR in any given time. Neutrophil to lymphocyte ratios (NLR) will be obtained from differential counts. To assess levels of GC excretion in response to stress, variation in GC concentrations around the intervention (anesthesia for samples collection) will be tested using a repeated-measures analysis of variance (rANOVA). To assess if there is statistical difference of the outcomes (cortisol levels, N/L ratio) between comparison groups (HV shedding and non-shedding), we will use generalized linear mixed models (GLMM) using identity and cohort as random effects and species, sex, age group and time in captivity as fixed factors. All statistical analysis will be performed in Stata 13.0 with a 95%CI and a level of significance of 5%.

LITERATURE CITED

1. Shanee N, Mendoza AP, Shanee S. Diagnostic overview of the illegal trade in primates and law enforcement in Peru. American Journal of Primatology. 2015;(December):1–12.

2. Leberatto AC. A Typology of Market Sellers of Protected Wildlife Across Peru. Deviant Behavior. 2017;38(12):1352–70.

3. D'Cruze N, Macdonald DW. A review of global trends in CITES live wildlife confiscations. Nature Conservation. 2016;15:47–63.

4. Bush ER, Baker SE, Macdonald DW. Global trade in exotic pets 2006-2012. Conservation Biology. 2014;28(3):663–76.

5. IUCN. IUCN Guidelines for the Placement of Confiscated Animals. Prepared by the IUCN/SSC Re-introduction Specialist Group. 2002;(February):1–27.

6. IUCN/SSC. IUCN guidelines for reintroductions and other conservation translocations. Vol. 20, Ecologial Applications. 2013. 57 p.

7. Karesh W, Cook R, Bennett E, Newcomb, J. Wildlife Trade and Global Disease Emergence. Emerging Infectious Diseases. 2005;11(7):1000–2.

8. Webster RG. Wet markets—a continuing source of severe acute respiratory syndrome and influenza? The Lancet. 2004 Jan;363(9404):234–6.

9. Woo PC, Lau SK, Yuen K. Infectious diseases emerging from Chinese wet-markets: zoonotic origins of severe respiratory viral infections: Current Opinion in Infectious Diseases. 2006 Oct;19(5):401–7.

10. Chomel BB, Belotto A, Meslin FX. Wildlife, exotic pets, and emerging zoonoses. Emerging Infectious Diseases. 2007;13(1):6–11.

11. LeBreton M, Switzer WM, Djoko CF, Gillis A, Jia H, Sturgeon MM, et al. A gorilla reservoir for human T-lymphotropic virus type 4. Emerging Microbes & Infections. 2014;3(1):e7.

12. Engel G a, Small CT, Soliven K, Feeroz MM, Wang X, Kamrul Hasan M, et al. Zoonotic simian foamy virus in Bangladesh reflects diverse patterns of transmission and co-infection. Emerging Microbes & Infections. 2013;2(9):e58.

13. Barragan K, Brieva C. Tuberculosis y Micobacteriosis en primates neotropicales en cautiverio: Un enfoque desde la conservación. Revista de la Facultad de Medicina Veterinaria y Zootecnia. 2005;52(2):128–43.

14. Barragan K, Brieva C, Guerrero M. Estudio Preliminar de especies de Micobacteria en primates colombianos no humanos en dos centros de rescate de fauna silvestre en Bogota. In: Acta Biologica Colombiana. 2005. p. 79.

15. Gilardi K, Oxford K, Gardner-Roberts D, Kinani J-F, Spelman L, Barry P, et al. Human herpes simplex virus type 1 in confiscated gorilla. Emerging Infectious Diseases. 2014;20(11):1883–6.

16. Jones JC, Sonnberg S, Koçer ZA, Shanmuganatham K, Seiler P, Shu Y, et al. Possible role of songbirds and parakeets in transmission of influenza A(H7N9) virus to humans. Emerging Infectious Diseases. 2014;20(3):380–5.

17. Cheng VCC, Lau SKP, Woo PCY, Yuen KY. Severe Acute Respiratory Syndrome Coronavirus as an Agent of Emerging and Reemerging Infection. Clinical Microbiology Reviews. 2007;20(4):660–94.

18. Hutson CL, Lee KN, Abel J, Carroll DS, Montgomery JM, Olson VA, et al. Monkeypox zoonotic associations: Insights from laboratory evaluation of animals associated with the multi-state US outbreak. American Journal of Tropical Medicine and Hygiene. 2007;76(4):757–67.

19. Jones KE, Patel NG, Levy MA, Storeygard A, Balk D, Gittleman JL, et al. Global trends in emerging infectious diseases. Nature. 2008;451(7181):990–3.

20. Bueno I, Smith KM, Sampedro F, Machalaba CC, Karesh WB, Travis DA. Risk Prioritization Tool to Identify the Public Health Risks of Wildlife Trade: The Case of Rodents from Latin America. Zoonoses and Public Health. 2016;63(4):281–93.

21. Gómez A, Aguirre AA. Infectious diseases and the illegal wildlife trade. Annals of the New York Academy of Sciences. 2008;1149(JANUARY 2009):16–9.

22. Smith KM, Anthony SJ, Switzer WM, Epstein JH, Seimon T, Jia H, et al. Zoonotic viruses associated with illegally imported wildlife products. PLoS ONE. 2012;7(1).

23. Hu B, Zeng LP, Yang X Lou, Ge XY, Zhang W, Li B, et al. Discovery of a rich gene pool of bat SARS-related coronaviruses provides new insights into the origin of SARS coronavirus. PLoS Pathogens. 2017;13(11):1–27.

24. Reed K, Melski J, B GM, Regnery R, Sotir MJ, Wegner M, et al. The detection of monkeypox in humans in the western hemisphere. The New England Journal of Medicine. 2004;350(4):342–50.

25. Ghersi B, Mendoza A, Razuri H, Romero A, Bennett A, Switzer W, et al. Presence of Human Herpes Virus in Captive New World Primates in Peru. In: Proceedings of the 60th International Wildlife Disease Association Conference. Quebec; 2011.

26. Ghersi BM, Jia H, Aiewsakun P, Katzourakis A, Mendoza P, Bausch DG, et al. Wide distribution and ancient evolutionary history of simian foamy viruses in New World primates. Retrovirology. 2015;12(1):1–19.

27. Rosenbaum M, Mendoza P, Ghersi BM, Wilbur AK, Perez-Brumer A, Cavero Yong N, et al. Detection of Mycobacterium tuberculosis Complex in New World Monkeys in Peru. EcoHealth. 2015;12(2):288–97.

28. Zariquiey C, Nuñez C, Mendoza P, Rosenbaum M, De La Puente M, Uhart M, et al. Hemoparasites in Captive Non-human Primates: Risks for public and animal health. In: American Society of Tropical Medicine and Hygiene. 2012. p. 193.

29. Aysanoa E, Mayor P, Mendoza AP, Zariquiey CM, Morales EA, Pérez JG, et al. Molecular epidemiology of Trypanosomatids and *Trypanosoma cruzi* in primates from Peru. EcoHealth. 2017;2015(Who 2014):732–42.

30. Medina G C, Morales C S, Navarrete Z M. Resistencia Antibiótica de Enterobacterias Aisladas de Monos (Ateles , Callicebus y Lagothrix) en Semicautiverio en un Centro de Rescate , Perú. Revista de Investigaciones Veterinarias de Peru. 2017;28(2):418–25.

31. Chi F, Leider M, Leendertz F, Bergmann C, Boesch C, Schenk S, et al. New Streptococcus pneumoniae Clones in Deceased Wild Chimpanzees . 2007;189(16):6085–8.

32. Kondgen S, Kuhl H, Goran PKN, Walsh PD, Schenk S, Ernst N, et al. Pandemic Human Viruses Cause Decline of Endangered Great Apes. Current Biology. 2008;18:260–4.

33. Leendertz FH, Pauli G, Maetz-rensing K, Boardman W, Nunn C, Ellerbrok H, et al. Pathogens as drivers of population declines : The importance of systematic monitoring in great apes and other threatened mammals. 2006;1.

34. Palacios G, Lowenstine LJ, Cran MR, Gilardi KVK, Lukasik-braum M, Kinani J, et al. Human Metapneumovirus Infection in Wild Mountain Gorilla, Rwanda. Emerging Infectious Diseases. 2011;17(4):711–3.

35. Coscolla M, Lewin A, Metzger S, Maetz-rennsing K, Calvignac-spencer S, Nitsche A, et al. Novel Mycobacterium tuberculosis Complex Isolate from a Wild Chimpanzee. Emerging Infectious Diseases. 2013;19(6):969–76.

36. Schaumburg F, Alabi AS, Köck R, Mellmann A, Kremsner PG, Boesch C, et al. Highly divergent Staphylococcus aureus isolates from African non-human primates. 2012;4:141–6.

37. deMello MT, Raick AN. Surto fatal de infeccao herpetica em pequeno grupo de Callithrix jacchus. In: 2nd Congresso Brasileiro de Primatologia, Campinas. 1985. p. 495.

38. Bruno SF, Liebhold MM, Mätz-Rensing K, Romao MA, Didier A, Brandes F, et al. [Herpesvirus infections in free living black tufted ear marmosets (Callithrix penicillata, E. Geoffroyi 1812) at the State Park of Serra da Tiririca, Niterói, Rio de Janeiro, Brazil]. Berliner und Münchener tierärztliche Wochenschrift. 1997;110(11–12):427–30.

39. Imura K, Chambers JK, Uchida K, Nomura S, Suzuki S. Herpes Simplex Virus Type 1 Infection in Two Pet Marmosets in Japan. 2014;7–10.

40. Huemer HP, Clara L, Czedik-Eysenberg T, Nowotny N, Reifinger M. Fatal infection of a pet monkey with Human herpesvirus 1. Emerging Infectious Diseases. 2002;8(6):639–41.

41. Gozalo AS, Montoya EJ, Weller RE. Dyscoria associated with herpesvirus infection in owl monkeys (Aotus nancymae). Journal of the American Association for Laboratory Animal Science : JAALAS. 2008;47(4):68–71.

42. Hermosa C, Gonzales C, Mamani J. Reporte de Herpesvirus en mono aullador (Alouatta seniculus) cría proveniente de una donación. In: Resumenes del 1er Simposio Nacional de Primatología en el Perú. Lima; 2011.

43. Juan-Sallés C, Ramos-Vara J a, Prats N, Solé-Nicolás J, Segalés J, Marco a J. Spontaneous herpes simplex virus infection in common marmosets (Callithrix jacchus). Journal of veterinary diagnostic investigation : official publication of the American Association of Veterinary Laboratory Diagnosticians, Inc. 1997;9(3):341–5.

44. Roizman B. The herpesviruses. Roizman B, editor. Springer Science & Business Media.; 1982. 445 p.

45. Rogers DL, McClure GB, Ruiz JC, Abee CR, Vanchiere JA. Endemic viruses of squirrel monkeys (Saimiri spp.). Comparative Medicine. 2015;65(3):232–40.

46. Katsch K, de Jong SJ, Schmidt M, Müller-Fleckenstein I, Fleckenstein B, Albrecht JC, et al. Species restriction of Herpesvirus saimiri and Herpesvirus ateles: Human lymphocyte transformation correlates with distinct signaling properties of viral oncoproteins. Virus Research. 2012;165(2):179–89.

47. Ferreyra H, Argibay H, Rinas M a, Uhart M. Squirrel monkey cytomegalovirus antibodies in free-ranging black howler monkeys (Alouatta caraya), Misiones, Argentina. Journal of wildlife diseases. 2012;48(2):512–3.

48. Costa EA, Luppi MM, Malta MDCC, Luiz APMF, de Araujo MR, Coelho FM, et al. Outbreak of human herpesvirus type 1 infection in nonhuman primates (Callithrix penincillata). Journal of wildlife diseases. 2011;47(3):690–3.

49. Casagrande RA, Pannuti CS, Kanamura C, Freire WS, Grespan A, Matushima ER. Fatal Human herpesvirus 1 (HHV-1) infection in captive marmosets (Callithrix jacchus and Callithrix penicillata) in Brazil: Clinical and pathological characterization. Pesquisa Veterinaria Brasileira. 2014;34(11):1109–14.

50. Schrenzel MD, Osborn KG, Shima A, Klieforth RB, Maalouf GA. Naturally occurring fatal herpes simplex virus 1 infection in a family of white-faced saki monkeys (Pithecia pithecia pithecia). Journal of Medical Primatology. 2003;32(1):7–14.

51. Greensill J, Sheldon JA, Renwick NM, Beer BE, Norley S, Goudsmit J, et al. Two Distinct Gamma-2 Herpesviruses in African Green Monkeys : a Second Gamma-2 Herpesvirus Lineage among Old World Primates ? 2000;74(3):1572–7.

52. Bobadilla Suarez M, Ewen JG, Groombridge JJ, Beckmann K, Shotton J, Masters N, et al. Using Qualitative Disease Risk Analysis for Herpetofauna Conservation Translocations Transgressing Ecological and Geographical Barriers. EcoHealth. 2017;14:47–60.

53. Sainsbury AW, Yu-Mei R, Ågren E, Vaughan-Higgins RJ, Mcgill IS, Molenaar F, et al. Disease Risk Analysis and Post-Release Health Surveillance for a Reintroduction Programme: the Pool Frog Pelophylax lessonae. Transboundary and Emerging Diseases. 2017;64(5):1530–48.

54. Barber-Meyer SM. Dealing with the clandestine nature of wildlife-trade market surveys. Conservation Biology. 2010;24(4):918–23.

55. Rosen GE, Smith KF. Summarizing the evidence on the international trade in illegal wildlife. EcoHealth. 2010;7(1):24–32.

56. Nijman V. An overview of international wildlife trade from Southeast Asia. Biodiversity and Conservation. 2010;19(4):1101–14.

57. UNODC. World Wildlife Crime Report. Vienna: UNODC, 2016. 2016.

58. Greatorex ZF, Olson SH, Singhalath S, Silithammavong S, Khammavong K, Fine AE, et al. Wildlife trade and human health in Lao PDR: An assessment of the zoonotic disease risk in markets. PLoS ONE. 2016;11(3):1–17.

59. Cao Ngoc A, Wyatt T. A Green Criminological Exploration of Illegal Wildlife Trade in Vietnam. Asian Journal of Criminology. 2013;8(2):129–42.

60. Daut EF, Brightsmith DJ, Peterson MJ. Role of non-governmental organizations in combating illegal wildlife-pet trade in Peru. Journal for Nature Conservation. 2015;24(C):72–82.

61. Daut EF, Brightsmith DJ, Mendoza AP, Puhakka L, Peterson MJ. Illegal domestic bird trade and the role of export quotas in Peru. Journal for Nature Conservation. 2015;27:44–53.

62. Bodmer R, Pezo Lozano E. Rural Development and Sustainable Wildlife Use in Peru. Conservation Biology. 2009;15(4):1163–70.

63. Gastañaga M, MacLeod R, Hennessey B, Núñez JU, Puse E, Arrascue A, et al. A study of the parrot trade in Peru and the potential importance of internal trade for threatened species. Bird Conservation International. 2011;21(1):76–85.

64. Antunes AP, Fewster RM, Venticinque EM, Peres CA, Levi T, Röhe F, et al. Empty forest or empty rivers? A century of commercial hunting in Amazonia. Science Advances. 2016;2(10):e1600936–e1600936.

65. Leberatto AC. Understanding the illegal trade of live wildlife species in Peru. Trends in Organized Crime. 2016;1–25.

66. Shanee N. Trends in local wildlife hunting, trade and control in the tropical andes biodiversity hotspot, northeastern Peru. Endangered Species Research. 2012;19(2):177–86.

67. TRAFFIC. What's Driving the Wildlife Trade? A Review of Expert Opinion on Economic and Trade Control Efforts in Cambodia, Indonesia, Lao PDR, and Vietnam. East Asia and Pacific Region Sustainable Development Discussion Papers. Washington, DC; 2008.

68. Mcnamara J, Rowcliffe M, Cowlishaw G, Alexander JS, Brenya A. Characterising Wildlife Trade Market Supply- Demand Dynamics. 2016;1–18.

69. Bello R, Rosemberg F, Timson S, Escate W. Importancia del monitoreo post-liberación de monos araña (Ateles chamek) reintroducidos en el sureste de la Amazonia peruana. In: La primatología en Latinoamerica 2. 2018. p. 625–38.

70. Svensson MS, Shanee S, Shanee N, Bannister FB, Cervera L, Donati G, et al. Disappearing in the night: An overview on trade and legislation of night monkeys in south and central America. Folia Primatologica. 2017;87(5):332–48.

71. Mackenzie DI, Royle JA. Designing occupancy studies : general advice and allocating survey effort. 2005;1105–14.

72. Sharma K, Wright B, Joseph T, Desai N. Tiger poaching and trafficking in India: Estimating rates of occurrence and detection over four decades. Biological Conservation. 2014;179:33–9.

73. Pires SF, Schneider JL, Herrera M, Tella JL. Spatial, temporal and age sources of variation in parrot poaching in Bolivia. Bird Conservation International. 2016;26(3):293–306.

74. Schulenberg TS, editor. Birds of Peru. Princeton: Princeton University Press; 2007. 656 p. (Princeton field guides).

75. Pacheco V, Cadenillas R, Salas E, Tello C. Diversidad y endemismo de los mamíferos del Perú Diversity and endemism of Peruvian mammals. 2009;28.

76. Eftelioglu E, Tang X, Shekhar S. Crime Hotspot Detection: A Computational Perspective. 2016.

77. Unwin S, Robinson IAN, Schmidt V, Colin C, Ford L, Humle T. Does Confirmed Pathogen Transfer between Sanctuary Workers and Great Apes Mean that Reintroduction Should not Occur ? Commentary on " Drug-resistant human Staphylococcus aureus findings in sanctuary apes and its threat to wild ape populations ." 2012;8(July):1–8.

78. Kock RA, Woodford MH, Rossiter PB. Disease risks associated with the translocation of wildlife: -EN- -FR- Risques sanitaires associés aux transferts de faune sauvage -ES- Riesgos sanitarios ligados a la traslocación de animales salvajes. Revue Scientifique et Technique de l'OIE. 2010 Aug 1;29(2):329–50.

79. IUCN/OIE. Guidelines for Wildlife Disease Risk Analysis. 2014;24.

80. Hartley M, Sainsbury A. Methods of Disease Risk Analysis in Wildlife Translocations for Conservation Purposes. EcoHealth. 2017 Mar;14(S1):16–29.

81. Sainsbury AW, Vaughan-higgins RJ. Analyzing Disease Risks Associated with Translocations. Conservation Biology. 2012;26(3):442–52.

82. Hopkins ME, Nunn CL. A global gap analysis of infectious agents in wild primates: Gap analysis of primate parasites. Diversity and Distributions. 2007 Jun 1;13(5):561–72.

83. Nunn CL, Altizer SM. The global mammal parasite database: An online resource for infectious disease records in wild primates. Evolutionary Anthropology: Issues, News, and Reviews. 2005 Jan 25;14(1):1–2.

84. Mendoza A, Rosenbaum M, Ghersi B, Cavero N, Ibañez Y, De La Puente M, et al. Health risks associated with the trade of pet monkeys in Peru. In: Proceedings of the 61 International Wildlife Disease Association Conference. Lyon; 2012.

85. Rosenbaum MH, Núñez J, Lucas C, Ghersi B, Mendoza P, Edgel KA, et al. Gastrointestinal parasites in non-human primates with close contact to humans in the Peruvian Amazon. In: 60th Annual International Conference of the Wildlife Disease Association. Quebec, Canada; 2011. p. 39.

86. Smith KM, Zambrana-Torrelio C, White A, Asmussen M, Machalaba C, Kennedy S, et al. Summarizing US Wildlife Trade with an Eye Toward Assessing the Risk of Infectious Disease Introduction. EcoHealth. 2017 Mar;14(1):29–39.

87. Davidson W, Regnery RL, Reynolds MG, Hutson CL, Li Y, Damon IK, et al. Monkeypox zoonotic associations: Insights from laboratory evaluation of animals associated with the multi-state US outbreak. The American Journal of Tropical Medicine and Hygiene. 2007 Apr 1;76(4):757–68.

88. Joseph U, Su YCF, Vijaykrishna D, Smith GJD. The ecology and adaptive evolution of influenza A interspecies transmission. Influenza and Other Respiratory Viruses. 2017 Jan;11(1):74–84.

89. Pedersen AB, Altizer S, Poss M, Cunningham AA, Nunn CL. Patterns of host specificity and transmission among parasites of wild primates. International Journal for Parasitology. 2005 May;35(6):647–57.

90. Pedersen AB, Davies TJ. Cross-Species Pathogen Transmission and Disease Emergence in Primates. EcoHealth. 2009 Dec;6(4):496–508.

91. Davies TJ, Pedersen AB. Phylogeny and geography predict pathogen community similarity in wild primates and humans. Proceedings of the Royal Society B: Biological Sciences. 2008 Jul 22;275(1643):1695–701.

92. Smiley Evans T, Barry PA, Gilardi KV, Goldstein T, Deere JD, Fike J, et al. Optimization of a Novel Non-invasive Oral Sampling Technique for Zoonotic Pathogen Surveillance in Nonhuman Primates. Rimoin A, editor. PLOS Neglected Tropical Diseases. 2015 Jun 5;9(6):e0003813.

93. Wang N, Baldi PF, Gaut BS. Phylogenetic analysis , genome evolution and the rate of gene gain in the Herpesviridae. 2007;43:1066–75.

94. Davison AJ. Herpesvirus systematics §. Veterinary Microbiology. 2010;143(1):52–69.

95. Eberle R, Jones-Engel L. Understanding Primate Herpesviruses. Journal of Emerging Diseases and Virology. 2017;3(1):1–11.

96. McCarthy K, Tosolini FA. A review of Primate Herpes Viruses. Proceedings of the Royal Society of Medicine. 1975;68:11–6.

97. Roizman B, Whitley RJ. An Inquiry into the Molecular Basis of HSV Latency and Reactivation. Annual Review of Microbiology. 2013;67(1):355–74.

98. Estep RD, Messaoudi I, Wong SW. Simian herpesviruses and their risk to humans. Vol. 28, Vaccine. 2010.

99. Looker KJ, Magaret AS, Turner KME, Gottlieb SL, Newman LM. Global Estimates of Prevalent and Incident Herpes Simplex Virus Type 2 Infections in 2012. 2012;1–23.

100. Mätz-Rensing K, Jentsch KD, Rensing S, Langenhuyzen S, Verschoor E, Niphuis H, et al. Fatal Herpes simplex infection in a group of common marmosets (Callithrix jacchus). Veterinary pathology. 2003 Jul;40(4):405–11.

101. Evans TS, Lowenstine LJ, Gilardi K V., Barry PA, Ssebide BJ, Kinani JF, et al. Mountain gorilla lymphocryptovirus has Epstein-Barr virus-like epidemiology and pathology in infants. Scientific Reports. 2017;7(1).

102. Evans TS, Lowenstine LJ, Gilardi K V., Barry PA, Ssebide BJ, Kinani JF, et al. Mountain gorilla lymphocryptovirus has Epstein-Barr virus-like epidemiology and pathology in infants. Scientific Reports. 2017;7(1):1–11.

103. White JA, Todd PA, Yee JAL, Kalman-Bowlus A, Rodgers KS, Xiaowei Y, et al. Prevalence of viremia and oral shedding of rhesus rhadinovirus and retroperitoneal fibromatosis herpesvirus in large age-structured breeding groups of rhesus macaques (Macaca mulatta). Comparative Medicine. 2009;59(4):383–90.

104. Valimaa H, Waris M, Hukkanen V, Blankenvoorde M, Nieuw Amerongen A V, Tenovuo J. Salivary Defense Factors in Herpes Simplex Infection. J Dent Res. 2002;81(6):416–21.

105. Crespi CM, Cumberland WG, Wald A, Corey L, Blower S. Longitudinal study of herpes simplex virus type 2 infection using viral dynamic modelling. Sexually Transmitted Infections. 2007;83(5):359–64.

106. Varnell ED, Kaufman HE, Hill JM, Thompson HW. Cold stress-induced recurrences of herpetic keratitis in the squirrel monkey. Investigative ophthalmology & visual science. 1995;36(6):1181–3.

107. Prösch S, Wendt CEC, Reinke P, Priemer C, Oppert M, Krüger DH, et al. A novel link between stress and human cytomegalovirus (HCMV) infection: Sympathetic hyperactivity stimulates HCMV activation. Virology. 2000;272(2):357–65.

108. Sandgren KJ, Bertram K, Cunningham AL. Understanding natural herpes simplex virus immunity to inform next-generation vaccine design. 2016;5(7):e94-8.

109. Glaser R, Kiecolt-Glaser JK. Stress-induced immune dysfunction: implications for health. Nature Reviews Immunology. 2005;5:243–51.

110. Evans TS, Barry PA, Gilardi K V., Goldstein T, Deere JD, Fike J, et al. Optimization of a novel non-invasive oral sampling technique for zoonotic pathogen surveillance in nonhuman primates. PLoS Neglected Tropical Diseases. 2015;9(6).

111. McDermott D, Mendoza AP, Smiley-Evans T, Zavaleta M, Da'Dara A, Alarcon J, et al. Optimizing a noninvasive oral sampling technique for semi-captive Neotropical primates in Peru (Accepted). Journal of Wildlife Diseases.

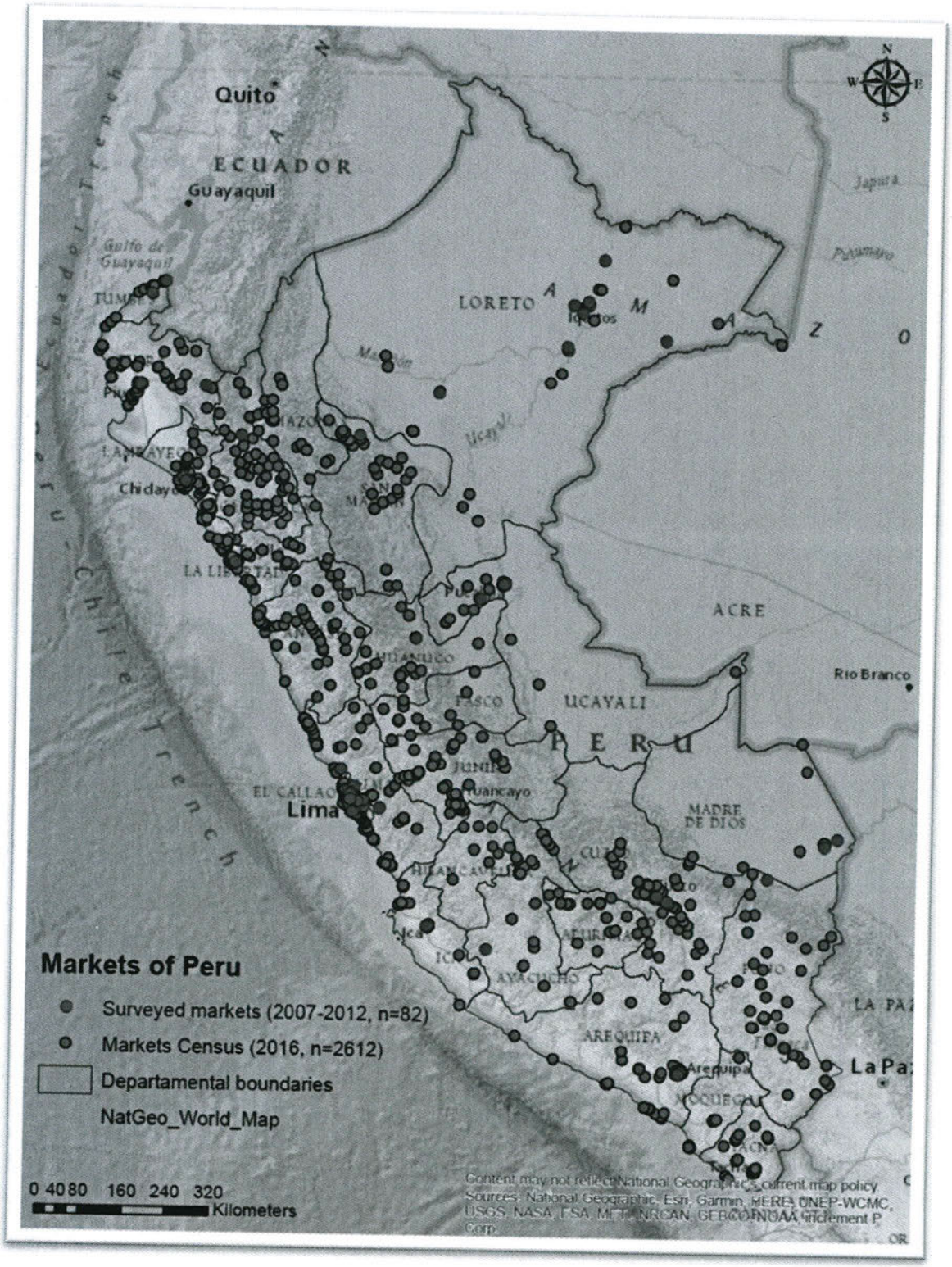
112. Vandevanter DR, Warrener P, Bennett L, Schultz ER, Coulter S, Garber RL, et al. Detection and analysis of diverse herpesviral species by consensus primer PCR. Journal of Clinical Microbiology. 1996;34(7):1666–71.

113. Chmielewicz B, Goltz M, Ehlers B. Detection and multigenic characterization of a novel gammaherpesvirus in goats. Virus Research. 2001;75(1):87–94.

114. Shutt K, Setchell JM, Heistermann M. Non-invasive monitoring of physiological stress in the Western lowland gorilla (Gorilla gorilla gorilla): Validation of a fecal glucocorticoid assay and methods for practical application in the field. General and Comparative Endocrinology. 2012 Nov;179(2):167–77.

115. Rimbach R, Heymann EW, Link A, Heistermann M. Validation of an enzyme immunoassay for assessing adrenocortical activity and evaluation of factors that affect levels of fecal glucocorticoid metabolites in two New World primates. General and Comparative Endocrinology. 2013 Sep;191:13–23.

APPENDIX 1. Distribution of wet markets of Peru. Blue dots represent all market locations registered by the 2016 National Census of markets. Red dots represent the location of markets surveyed to detect wildlife trafficking between 2007-2012.



Marieke Hilarides Rosenbaum, DVM, MPH, MS

Track Director, DVM/MPH Program; Research Assistant Professor
Infectious Disease and Global Health, Cummings School of Veterinary Medicine at Tufts University
Public Health and Community Medicine, Tufts University School of Medicine
Affiliated Faculty Member, Tufts Institute of the Environment, Tufts University

The Cummings School of Veterinary Medicine at Tufts University
200 Westboro Road, Bernice Barbour Wildlife Building, Room 115
Westboro MA, 01536
Office: 508.887.4344
Email: Marieke.Rosenbaum@tufts.edu

Home Address:

[redacted]

Education

2014	Doctor of Veterinary Medicine, The Cummings School of Veterinary Medicine at Tufts University, North Grafton, MA
2014	Master of Public Health, Tufts University School of Medicine, Boston, MA
2014	Master of Science, The Cummings School of Veterinary Medicine at Tufts University, North Grafton, MA Thesis: 'Foil or Function? Resident Phagocytes interfere with engraftment of locally-derived mesenchymal cells in the murine lung.' Advisor: Dr. Andrew Hoffman
2004	Bachelors of Science (Major: Biology), Allegheny College, Meadville, PA

Fellowship

2010-2012	NIH/Fogarty International Clinical Research Scholar, University of Washington, Department of Global Health, Lima, Peru

Licensure

2014-present	Veterinary License #7504, Massachusetts Board of Registration in Veterinary Medicine, MA
2005-2006	Wildlife Rehabilitation Permit, Massachusetts Division of Fish and Wildlife, MA

Academic Appointments

2017-present	Affiliated Faculty Member Tufts Institute of the Environment Tufts University, Medford, MA
2014-present	Research Assistant Professor, Primary Appointment Infectious Disease and Global Health The Cummings School of Veterinary Medicine at Tufts University, North Grafton, MA
2014-present	Research Assistant Professor, Secondary Appointment Public Health and Community Medicine Tufts University School of Medicine, Boston, MA

Non-Academic Employment

2015-present	Relief Veterinarian, The South Bay Veterinary Group, Boston, MA
2014-2015	Associate Veterinarian, The South Bay Veterinary Group, Boston, MA
2005-2006	Assistant Aquarist, Penguin Department, New England Aquarium, Boston, MA

2004-2005 Wildlife Rehabilitator, Wildcare Inc., Orleans, MA

Awards and Honors

Henry J. Foster Scholar, 2010, 2013	The Cummings School of Veterinary Medicine
Veterinary Student Grant Recipient, 2012	Morris Animal Foundation
Oral Presentation Award, 2011	Simposio La Primatología en el Perú, Lima Peru Research
Research Training Award, 2006-2010	US Army Medical Command
Graduate Research Training Award, 2008-2009	NIH
Summer Research Training Award, 2008	NIH
1st Place Prize, 2008	Tufts' Annual Veterinary Student Research Competition
Louise Cies Graduate Award, 2007-2008	New England Farm and Garden Association
Veterinary Student Scholar, 2007	Merck-Merial-NIH

University Committee Assignments

Curriculum Committee, Chair
2018-present The Cummings School of Veterinary Medicine at Tufts University
International Veterinary Medicine Certificate Program Committee, Invited Member
2018-present The Cummings School of Veterinary Medicine at Tufts University
Faculty Research Advisory Committee, Invited Member
2018-present Tufts University School of Medicine
MS Infectious Disease and Global Health Program Committee, Appointed Member
2015-present The Cummings School of Veterinary Medicine at Tufts University
Global Health Selection Committee, Invited Member
2017-present Tufts University School of Medicine
DVM/MPH Admissions Committee, Invited Member
2015-present Tufts University School of Medicine
IRB Committee, Invited Member
2017-present University of Global Health Equity, Rwanda
Curriculum Committee, Appointed Member
2015-2018 The Cummings School of Veterinary Medicine at Tufts University
Advance Education Committee, Appointed Member
2014-2017 The Cummings School of Veterinary Medicine at Tufts University
Faculty Council, Elected Member
2015-2017 The Cummings School of Veterinary Medicine at Tufts University

Graduate Student Training

- Siena Mittman, DVM Candidate 2021, The Cummings School of Veterinary Medicine at Tufts University, "Implementation of the IUCN Guidelines for the Placement of Confiscated Animals and the Challenges Facing Confiscated Primate Rehabilitation in Peru."
- Kendall Carlin, DVM Candidate 202, The Cummings School of Veterinary Medicine at Tufts University, "Prevalence and characterization of influenza A virus in semi-captive, non-human primate species in Peru."
- Cambrey Knapp, DVM/MPH Candidate 2021, The Cummings School of Veterinary Medicine at Tufts University, "Determining Zika virus prevalence in Peruvian populations of trafficked New World monkeys"
- Tatyana Kalani, DVM/MPH Candidate 2021, The Cummings School of Veterinary Medicine at Tufts University, "America's Lead Crisis: A One Health Approach to Combat Environmental Lead Contamination in Urban Areas."
- Mattison Peters, DVM/MPH Candidate 2020, The Cummings School of Veterinary Medicine at Tufts University, "Effects of Massachusetts and Rhode Island Vibrio Control Plan Regulatory Requirements on *Vibrio Parahaemolyticus* in Post-Harvest Eastern Oysters (*Crassostrea virginica*)
- Jason Doll, DVM/MPH Candidate 2020, The Cummings School of Veterinary Medicine at Tufts University, "Accessibility in the Arctic: Evaluation of Biosecurity in Backyard Poultry in Anchorage/Matanuska-Susitna Valley, Alaska."

- Abby Clayton, DVM/MPH Candidate 2019, The Cummings School of Veterinary Medicine at Tufts University, "Antimicrobial Resistance in Rehabilitated Harbor Seals (*Phoca vitulina*) in British Columbia: A Temporal Assessment."
- Charlie Cummings, DVM Candidate 2019, The Cummings School of Veterinary Medicine at Tufts University, "A Survey of Influenza A Prevalence Among Wild Urban Rodents in Boston, MA."
- Alyssa McDonagh, DVM Candidate 2019, The Cummings School of Veterinary Medicine at Tufts University, MPH Candidate 2019, University of Minnesota School of Public Health, "Urban Backyard Poultry Flocks in Massachusetts: A Preliminary Assessment of Salmonella Shedding."
- Darby McDermott, DVM/MPH Candidate 2019, The Cummings School of Veterinary Medicine at Tufts University, "Optimizing a Non-Invasive Oral Sampling Technique for Semi-Captive Neotropical Nonhuman Primates in Peru."
- Stephanie Chubb, DVM/MPH Candidate 2018, The Cummings School of Veterinary Medicine at Tufts University, "Assessing zoonotic gastrointestinal parasitism in dogs among unstably housed and domiciled pet owners in Worcester, MA."
- Ruairi White, DVM/MPH Candidate 2018, The Cummings School of Veterinary Medicine at Tufts University, "A survey of the prevalence and antimicrobial resistance of *Staphylococcus aureus* in wild urban rodents in Boston, MA."
- Kenneth Sui and Amanda Knee, DVM/MPH candidates 2018, The Cummings School of Veterinary Medicine at Tufts University, "A Gender Sensitive Mixed Methods Assessment of peste des Petits Ruminants (PPR) Epidemiology and Resources for Eradication in Karamoja, Ugnada."
- Gabriella Villanueva, DVM/MPH Candidate 2017, The Cummings School of Veterinary Medicine at Tufts University, "Evaluating the impact of a free spay and neuter program in Samana, Dominican Republic."
- Daniel Mordarski, DVM/MPH Candidate 2017, The Cummings School of Veterinary Medicine at Tufts University, "Subclinical lead exposure in backyard chickens in MA."
- Nichole Smith, MBS/MPH 2016, Tufts University School of Medicine, "A Bird in the Hand: Understanding Human-Poultry Interactions that may Pose Public Health Risk among Immigrant Communities in MA."
- Andrea Brown, MS in One Health 2016, Royal Veterinary College/London School of Hygiene and Tropical Medicine, "Understanding the risk of lead exposure via backyard chicken ownership and egg consumption in rural New Hampshire."

Teaching Responsibilities

2018-present	VET201 Microbial Pathogenesis, Lecturer, The Cummings School of Veterinary Medicine at Tufts University
2018-present	IDGH572 Introduction to Global Health, Course Director, The Cummings School of Veterinary Medicine at Tufts University
2018-present	EH257: Water Pollution, Invited Guest Lecturer, The Harvard T.H. Chan School of Public Health
2015-present	PH708 DrPH Seminar, Lecturer and Facilitator, Tufts University School of Medicine
2015-present	IDGH540 Infectious Diseases of Humans and Animals I, Director of the Urogenital Tract Disease Unit, The Cummings School of Veterinary Medicine at Tufts University
2014-present	CMPH151, 251, 351, 451 Public Health Integration, Course Director, Tufts University School of Medicine
2014-present	CMPH 170 Global Population Health, Course Director, Tufts University School of Medicine
2014-present	VET233 Introduction to Public Health, Course Director, The Cummings School of Veterinary Medicine at Tufts University
2015-2016	IDGH546 Journal Club, Co- Course Director, The Cummings School of Veterinary Medicine at Tufts University
2015-2016	CMPH207 Legal Basis of Public Health Veterinary Medicine, Lecturer and Facilitator, The Cummings School of Veterinary Medicine at Tufts University

Service

Veterinary Summer Research Program, Evaluation and Reviewer (2015-present)
BARC (Balancing Academic Careers with Raising Children) facilitator, Cummings School (2017-present)

Faculty Advisor, Student American Veterinary Medical Association, Cummings Chapter (2016-present)
SAVMA Annual Dog Wash, Faculty Volunteer (2017, 2018)
Adventures in Veterinary Medicine, Lecturer in Veterinary Public Health (2016-2018)
Diagnosing and Treating Backyard Chickens Continuing Education Event, Lecturer (2017)
Ambulatory Faculty Search Committee (2017)

Research Support

Influenza Virus in Boston's Urban Rodents.
Tufts Clinical and Translational Science Institute 2018 Pilot Studies Program
Role: Co-Investigator Dates: 05/01/2018 – 04/30,2019 Total: [redacted]

Use of third generation portable sequencing technology to facilitate rapid in-field detection of viral transmission between humans and primates involved in the Peruvian wildlife trade.
Role: Principal Investigator Dates: 06/01/2018 – 06/30/2019 Total: [redacted]

Soil Inequality Lab: an experimental and exploratory nomadic lab, interrogating the intersection of environmental justice and inequality using the scientific and artistic fields.
Role: Principal Investigator Dates: 08/01/2018 – 12/31/2019 Total: [redacted]

Assessing urban wild rodents as environmental reservoirs for Staphylococcus aureus.
Boston University Early Career Catalyst Award
Role: Co-Investigator Dates: 05/01/2016 – 09/01/2018 Total [redacted]

Validation of herpesviral and Zika virus PCR assays for use in Peruvian Neotropical primates in close contact with humans.
Tufts University School of Medicine Charlton Award
Role: Principal Investigator Dates: 07/01/2016 – 06/30/2017 Total: [redacted]

The role of cohabitation with production animals to gut microbiota and stunting in children in Guatemala.
Tufts Collaborates
Role: Co-Principal Investigator Dates: 07/01/2016 – 06/30/2017 Total: [redacted]

Pregnancy, parenthood, and family planning among veterinary trainees: Examining the state of current demographics and policies related to parenting and family planning among students and house-officers at accredited US Veterinary Institutions.
Cummings School of Veterinary Medicine Seed Grant
Role: Principal Investigator Dates: 06/01/2016-05/31/2017 Total: [redacted]

Lead and Salmonella in urban poultry flocks in Boston: Evaluating backyard chickens as sentinels of environmental contamination and vehicles for human exposure.
Tufts Clinical and Translational Science Institute 2016 Pilot Studies Program
Role: Principal Investigator Dates: 05/01/2016 – 04/30/2017 Total: [redacted]

Bibliography

Peer-reviewed publications:

- Cummings C, Hill N, Puryear W, Rogers B, Mukherjee J, Leibler J, **Rosenbaum M**, Runstadler J. Evidence of Influenza A in Wild Normay Rats (*Rattus norvegicus)* in Boston, Massachusetts. *Frontiers in Ecology and Evolution,* 14 March 2019.

- Molter B, Wayne A, Mueller M, Gibeley M, **Rosenbaum M**. Current Policies and Support Services for Pregnant and Parenting Veterinary Medical Students and House Officers at United States Veterinary Medical Training Institutions. *Journal of Veterinary Medical Education,* 2019, 46(2):145-152.

- McDonagh A, Leibler JH, Mukherjee J, Thachil A, Goodman LB, Riekofski C, Nee A, Forrester J, **Rosenbaum M.** Frequent human-poultry interactions and low prevalence of Salmonella in backyard chicken flocks in Massachusetts. *Zoonosis and Public Health,* 2019, 66(1):92-100.

- **Rosenbaum M,** Wayne A, Molter B, Mueller M. Pregnancy, Parenting, and Family Planning during Veterinary Training: Perceptions and Practices at US Veterinary Medical Training Institutions. *Journal of the American Veteirnary Medical Associatio*n, 2018, 253(10):1281-1288.

- Mordarski DC, Leibler JH, Talmadge MS, Wolfus GM, Pokras MA, **Rosenbaum MH**. Subclinical lead exposure among backyard chicken flocks in Massachusetts. *Journal of Avian Medicine and Surgery*, 2018, 32(2):185-193.

- Leibler JH, Basra K, Ireland T, McDonagh A, Ressijac C, Heiger-Bernays W, Vorhees D, **Rosenbaum M.** Lead exposure to children from consumption of backyard chicken eggs. *Environmental Research,* 2018, 167:445-452.

- Leibler JH, Robb K, Joh E, Gaeta JM, **Rosenbaum M**. Self-reported animal and ectoparasite exposure among urban homeless persons. *Journal of Health Care for the Poor and Underserved,* 2018, 29(2):664-675.

- **Rosenbaum M**, Mendoza P, Ghersi BM, Wilbur AK, Perez-Brumer A, Cavero Yong N, Kasper MR, Montano S, Zunt J, Jones-Engel L. Detection of *Mycobacterium tuberculosis* complex in Peruvian New World monkeys. *EcoHealth,* 2014, 12(2):288-297.

- Pollett S, Rocha C, Zerpa R, Patino L, Valencia A, Camina M, Guevara J, Lopez M, Chuquiray N, Salazar-Lindo E, Calampa C, Casapia M, Meza R, Bernal M, Tilley D, Gregory M, Maves R, Hall E, Jones F, Arrioloa SC, **Rosenbaum M**, Perez J, Kasper M. Campylobacter antimicrobial resistance in Peru: a ten-year observational study. *BMC Infectious Disease*, 2012, 12:193.

In press:

- Franscisco I, Jiz M, **Rosenbaum M,** Steele JA. Knowledge, attitudes, and practices related to schistosomiasis transmission and control in Leyte, Philippines. [*PLOS Neglected Tropical Diseases*]

- Smith A, Wayne A, Fellman C, **Rosenbaum M**. A Retrospective Study Describing the Usage Patterns of Carbapenem Antimicrobials in Dogs and Cats at a Veterinary Tertiary Care Hospital. *[Journal of Veterinary Internal Medicine, September 2018]*

- McDermott D, Mendoza AP, Smiley-Evans T, Zavaleta M, Da'Dara A, Bello R, Alarcon J, and **Rosenbaum M.** Optimizing a noninvasive oral sampling technique for semi-captive Neotropical primates in Peru. *[Journal of Wildlife Disease December]*

Book chapters:

- Mendoza AP, Mitman S, and **Rosenbaum M**. Non-Tuberculosis and Tuberculosis Causing Mycobacteria in Wild and Captive Monkeys. *[Invited contribution, revised and resubmitted for: Neglected Diseases in Monkeys: from the Monkey-Human Interface to One Health, Springer, 2019]*

- **Rosenbaum M** and Cheryl Greenacre. Common Toxicoses. *[Invited contribution under review for: Backyard Poultry Medicine and Surgery, 2nd Edition, Wiley, 2019]*

- **Rosenbaum M** and Beamer G. Tuberculosis. In: The International Encyclopedia of Primatology, Wiley-Blackwell, May 2017

Published abstracts (oral presentations and posters):

- Mendoza AP, McDermott D, Iturrizaga JA, Lozano K, Bello R, Zavaleta M, Alarcon J, Smiley-Evans T, **Rosenbaum MH**. Optimization of sampling techniques and molecular detection of Herpesviridae in Neotropical primates. *[Poster presentation at the European Wildlife Disease Association's 13th Annual Conference in Larissa, Thessaly, Greece, August275th – 31st, 2018]*

- Abby Clayton, Martin Haulena, Sarah Robinson, **Marieke Rosenbaum,** and Felicia Nutter. Microbiome and Antimicrobial Resistance in Rehabilitated Harbor Seals (*Phoca Vitulina*) of British Columbia. *[Poster presentation at the Wildlife Disease Association's Annual International Meeting in St. Augustine, FL, August 5th – 8th, 2018]*

- Komal Basra, **Marieke Rosenbaum,** Alyssa McDonagh, Catherine Ressijac, Thomas Ireland, Wendy Heiger-Bernays, Donna Vorhees, and Jessica H. Leibler. Children's Lead Exposure from Consumption of Backyard Chicken Eggs: Health Risks from a Non-traditional Source. *[Poster presentation at the ISES-ISEE 2018 Joint Annual Meeting in Ottawa, Canada, August 26th – 30th, 2018]*

- Leibler JH, Robb K, Joh E, Gaeta JM, **Rosenbaum M**. Self-reported animal and ectoparasite exposure among urban homeless persons. *[Poster presentation at the ISES-ISEE 2018 Joint Annual Meeting in Ottawa, Canada, August 26th – 30th, 2018]*

- **Rosenbaum M**, Ghersi BM, Canal E, Tejada R, Stewart J, Montano SM, Zunt JR, Kasper MR, Alarcon J. Leptospirosis in mammalian reservoirs and surface water in Alto Mayo valley, San Martin, Peru. *[Oral presentation at the American Society of Tropical Medicine and Hygiene's Annual Meeting in Atlanta, GA, November 11th – 15th, 2012]*

- **Rosenbaum M**, Núñez J, Lucas C, Ghersi BM, Mendoza P, Montano SM, Edgel KA, Lescano AG, Zunt JR. Gastrointestinal parasites in nonhuman primates with close contact to humans in the Peruvian Amazon. *[Oral presentation at the Wildlife Disease Association's Annual International Meeting in Québec City, Canada, August 14th – 19th, 2011]*

- **Rosenbaum M**, Ghersi BM, Jones-Engel L, Núñez J, Wilbur AK, Mendoza P, Edgel KA, Lescano AG, Kasper MR, Montano SM, Zunt JR. Describing the epidemiological landscape of tuberculosis, Enterobacteriaceae, and gastrointestinal parasites in New World primates and their caretakers in the Peruvian Jungle. *[Oral presentation to the American Public Health Association's Annual Meeting in Washington DC, October 29th -November 2nd, 2011]*

- Mazan MR, Lascola K, **Rosenbaum M**, Gruntman A, Hoffman AM. Alveolar macrophages are integral to compensatory lung regrowth in mice after pneumonectomy. *[Poster presentation at the American Thoracic Society's International Conference, San Diego, CA, May 15th – 20th, 2009]*

Ana Patricia MENDOZA BECERRA

[redacted]

Wildlife veterinarian with experience in conservation policy, wildlife epidemiology and public health research. I am interested in the study of health risks emerging from wildlife trafficking and human-induced habitat modifications. My previous research sought to demonstrate that illegal wildlife trade is an important source of zoonotic pathogens in Peru. The resulting information has been used to strengthen national epidemiological surveillance and to support a national strategy against wildlife trade (approved by the Peruvian government in 2017). My current work expands into the disease risks of primate reintroductions, seeking to contribute to primate conservation while ensuring the welfare of rescued primates.
Beyond research, I volunteer my time to support wildlife rehabilitation projects, conservation outreach, and veterinary education.

EDUCATION

Aug 2016 – Present	University of Missouri – St Louis. Missouri, USA. Department of Biology. Program of Ecology, Evolution and Systematics. ***PhD Student***
Mar 2012 – Present	Universidad Peruana Cayetano Heredia. Lima, Peru. ***Master en Ciencias en Investigación Epidemiológica (candidate)***
May 2009 – May 2010	Universidad of Iowa, Center for Emerging Infectious Diseases. Iowa city, Iowa, USA. ***Certificate in Epidemiology of Emerging Infectious Diseases.***
May 2005	Universidad Nacional Mayor de San Marcos, Facultad de Medicina Veterinaria. Lima, Peru. ***Médico Veterinaria.***
Apr 1998 – Dec 2003	Universidad Nacional Mayor de San Marcos, Facultad de Medicina Veterinaria. Lima, Peru. ***Bachiller en Medicina Veterinaria.***

Others:

- *Conservation Biology Course (200 hours).* Instituto de Pesquisa Ecológica, November 2010, Sao Paulo - Brazil.
- *Biological field techniques Course (135 hours).* Universidad San Antonio Abad del Cusco. November 2004. Cusco - Peru.

WORK EXPERIENCE

Jun 2015 – Present	Neotropical Primate Association Peru. ***Veterinary Advisor.***
Oct 2012 – May 2015	Wildlife Conservation Society. ***Wildlife Health and Health Policy Program Coordinator in Peru.***
Apr 2010 – Sep 2014	Wildlife Conservation Society. ***Peru Country Coordinator for the Emerging Pandemic Threats - PREDICT Program***
Feb 2009 – Apr 2010	Naval Medical Research Center Detachment. ***Veterinary researcher***
Jun 2008 – Dec 2009	Universidad Peruana Cayetano Heredia. ***Project Coordinator for the Global Avian Influenza Network Surveillance (GAINS) Program***
Jun 2007 – May 2008	Texas A&M University (Contractor). ***Research Project Coordinator for the Tambopata Macaw Project***
Feb 2007 – May 2007	Texas A&M University (Contractor). ***Staff veterinarian for the Tambopata Macaw Project***

PUBLICATIONS

Research papers

1. Mitman S, Rosenbaum M, Knapp C, Carlin K, Nutter F, Bello R, **Mendoza AP**. Challenges to IUCN Guidelines Implementation in the Rehabilitation and Release of Trafficked Primates in Peru (*In preparation*)

2. McDermott D, **Mendoza AP**, Smiley-Evans T, Zavaleta M, Da'Dara A, Alarcon JO, Bello R, Rosenbaum M. Optimizing a noninvasive oral sampling technique for semi-captive Neotropical primates in Peru. (*Accepted for publication in Journal of Wildlife Diseases*)
3. E. Aysanoa, P. Mayor, **P. Mendoza**, E.A. Morales, J.G. Perez, M. Bowler, C. Gonzalez, J.A. Ventocilla, G.C. Baldeviano, Andrés G. Lescano. 2017. Prevalence of Trypanosomatids and Trypanosoma cruzi in wild and captive primates from Peru. EcoHealth 14(4): 732-742. https://doi.org/10.1007/s10393-017-1271-8
4. Shanee N, **Mendoza AP**, Shanee S. 2015. Diagnostic overview of the illegal trade in primates and law enforcement in Peru. American Journal of Primatology. doi:10.1002/ajp.22516
5. Ghersi B, JiaH, Aiewsakun O, Katzourakis A, **Mendoza P,** Bausch D, Kasper M, Montgomery J, Switzer J. 2015. Wide distribution and ancient evolutionary history of simian foamy viruses in New World primates. Retrovirology 12:89
6. Daut E, Brightsmith DJ, **Mendoza AP**, Puhakka L, and Peterson M. 2015. Illegal Domestic Bird Trade and the Role of Export Quotas in Peru. Journal for Nature Conservation 27: 44-53
7. Rosenbaum M, **Mendoza AP**, Ghersi B, Wilbur AK, Perez-Brumer A, Cavero N, Kasper M, Montano S, Zunt J, Jones-Engel L. 2014. Detection of Mycobacterium tuberculosis Complex in New World Monkeys in Peru. Ecohealth 11(3) 279-448. doi: 10.1007/s10393-014-0996-x
8. Razuri H, Tokarz R, Ghersi B, Salmon-Mulanovich G, Guezala MC, Albujar C, **Mendoza AP**, Tinoco Y, Cruz C, Silva M, Vasquez A, Pacheco V, Stroher U, Wiggleton L, Cannon D, Rollin P, Nichol S, Hirschberg D, Lipkin WI, Bausch DG, Montgomery J. 2014. *Discovery of an Andes Hantavirus Variant in Rodents in the Southern Amazon Basin of Peru.* Emerg. Infect. Dis. 20(2)
9. Uhart M, Perez AA, Rostal M, Alandia Robles E, **Mendoza AP**, Nava A, Dejuste de Paula C, Miranda F, Iñíguez V, Zambrana C, Durigon E, Franco P, Joly D, Goldstein T, Karesh W and Mazet J. 2013. A 'One Health' Approach to Predict Emerging Zoonoses in the Amazon. Pp, 65-73 In: Chame M and Labarthe N (eds). Wildlife and Human Health: Experiences and Perspectives. FIOCRUZ, Rio de Janeiro.
10. Puerta L, Chávez G, Enciso M, **Mendoza AP.** 2010. *Infestación por esparganos en ranas del género Pristimantis (Anura, Strabomantiade) del Perú*. Rev. Peru. Biol. 17(2): 265 – 266.
11. Jori F, Gálvez HA, **Mendoza AP**, Céspedes M, Mayor P. 2008. Monitoring of Leptospira seroprevalence in a colony of captive collared peccaries (Tayassu tajacu) from the Peruvian Amazon. Journal of Research in Veterinary Science 86:383-387.
12. Enciso MA, Villena M, **Mendoza AP**, Chávez G. **2008.** Rapid survey on amphibian skin diseases in a mountain forest at the northern Andes of Peru. **Froglog**. 87:4-7
13. **Mendoza A**, Mayor P, Gálvez H, Céspedes M, Jori F. 2007. *Antibodies against Leptospira spp. in captive collared peccaries, Peru.* Emerg. Infect. Dis. ISSN: 1080-6059.

Books and book chapters

- **Mendoza AP**, Mitman S, Rosenbaum M. Mycobacterial infections in monkeys. In: S. Kanuff and L. Jones-Engel (Eds.). Neglected diseases in monkeys: from the monkey-human interface to One Health. Springer (Accepted for publication)
- **Mendoza AP,** Murillo Y, Piana R, De la Puente M, Gil L, Gálvez J, Vento R, Ploog K. 2015. Guía para el manejo de animales silvestres decomisados o hallados en abandono. Lima: WCS & SERFOR, 111p
- Murillo Y, Piana R, **Mendoza AP,** De la Puente M, Gil L, Gálvez J, Vento R, Ploog K. 2015. Guía de identificación y cuidados iniciales de animales silvestres decomisados o hallados en abandono. Lima: Lima: WCS & SERFOR, 134p
- Enciso MA and **Mendoza AP**. 2009. Endoparasitoses do trato digestorio en Aves. En: Avanços na Medicina de Animais Selvagens: Medicina de Aves. Curitiba: Associação Paranaense de Medicina de Animais Selvagens. Grupo Fowler. p. 307-336.

Thesis

- **Mendoza AP.** Seroprevalence of Leptospirosis in captive White-collared peccaries (*Tayassu tajacu*) in the Peruvian Amazonia. Universidad Nacional Mayor de San Marcos, 72 p. 2004

PRESENTATIONS IN INTERNATIONAL CONFERENCES (2004-2014)

- Mendoza AP, McDermott D, Iturrizaga JA, Lozano K, Bello R, Zavaleta M, Alarcon J, Smiley-Evans T, Rosenbaum M. Optimization of sampling techniques and molecular detection of Herpesviridae in Neotropical primates. Poster presentation in: **13th European Wildlife Disease Association Conference.** Larissa, Greece.
- De la Puente M, **Mendoza AP**, Rosenbaum M, Bernal M, Zariquiey CM., Cavero N, Tilley DH, Kasper M, Falcón N, Perez A, Uhart M. 2013. Zoonotic enteric bacteria and antibiotic resistance in captive neotropical primates in Perú. Oral presentation in: **1st Meeting of the Latin America Section – Wildlife Disease Association.** Sao Paulo, Brazil.
- De la Puente M, **Mendoza AP**, Rosenbaum M, Bernal M, Zariquiey CM., Cavero N, Tilley DH, Kasper M, Falcón N, Perez A, Uhart M. 2013. Zoonotic enteric bacteria and antibiotic resistance in captive neotropical primates in Perú. Oral presentation in: **1st Meeting of the Latin America Section – Wildlife Disease Association.** Sao Paulo, Brazil.
- De la Puente M, **Mendoza AP**, Rosenbaum M, Bernal M, Zariquiey CM., Cavero N, Tilley DH, Kasper M, Falcón N, Perez A, Uhart M. 2013. Zoonotic enteric bacteria and antibiotic resistance in captive neotropical primates in Perú. Oral presentation in: **1st Meeting of the Latin America Section – Wildlife Disease Association.** Sao Paulo, Brazil.
- **Mendoza AP**, Zariquiey C, Céspedes M, Gómez J, Cavero N, De la Puente M, Murillo Y, Perez A, Uhart M. 2013. Zoonotic disease outbreaks in Perú 2010-2013: gaps in the detection of pathogen sources. Poster presentation in: **2nd International Congress on Pathogens at the Human-Animal Interface – ICOPHAI.** Porto de Galinhas, Recife, Brazil.
- Murillo Y, Rosenbaum M, Ghersi B, Zariquiey C, Nuñez J, Cavero N, De la Puente M, Kasper M, Lescano M, Perez A, Uhart M, **Mendoza AP**. 2013. Primate rescue centers: the urban bridge for pathogen transmission between human and non-human primates?. Poster presentation in: **2nd International Congress on Pathogens at the Human-Animal Interface – ICOPHAI.** Porto de Galinhas, Recife, Brazil.
- **Mendoza AP,** Rosenbaum M, Ghersi B, Cavero N, Ibañez Y, De La Puente M, Sebastian M, Perez A, Nuñez J, Kasper M, Switzer B, Zunt J, Montgomery J, Uhart M. 2012. Health risks associated with the trade of pet monkeys in Peru. Oral presentation in: **2012 Wildlife Disease Association International Conference**, Lyon, Francia
- Rázuri H, Salmon-Mulanovich G, Vasquez A, Ghersi B, Guezala C, **Mendoza AP**, Gonzales C, Albujar C, Ortiz E, Tinoco Y, Nichol S, Bausch D, Montgomery J. 2011. Habitat perturbation and Hantaviruses in rodents in the southern Amazon region of Peru. Poster presentation in: **60th Annual Meeting of the American Society of Tropical Medicine and Hygiene**. Philadelphia, USA.
- Rosenbaum M, Ghersi B, Jones-Engel L, Núñez J, Wilbur AK, **Mendoza AP**, Edgel K, Andres G. Lescano, Matthew R. Kasper, Silvia M. Montano, Joseph R. Zunt. 2011. Describing the Epidemiological Landscape of Tuberculosis, Enteroviruses, Enterobacteriaceae, and Gastrointestinal Parasites in New World Primates and their Caretakers in the Peruvian Jungle. Oral presentation in: **13th American Public Health Association Annual Meeting & Exposition.** Washington, DC, USA.
- **Mendoza AP**, Brightsmith DJ, Alandia E, Suarez F, Cavero N, Lujan Villena M, Ibañez Y, Rynaby C, Ghersi B, Perez A, Uhart M, Montgomery JM. 2011. Wildlife trade as a potential source of emerging zoonotic pathogens in South America. Oral presentation in: **2011 American Association of Zoo Veterinarians Annual Conference**, Kansas City, Missouri, USA.
- **Mendoza AP**, Bernal M, Cavero N, Meza Y, Ghersi B, Brightsmith DJ, Montgomery JM, Perez A, Uhart M. Antibiotic Resistant Bacterial Strains in Traded Wildlife In Peru. Oral presentation in: **2011 Wildlife Disease Association International Conference**, Quebec, Canada.

- Ghersi B, **Mendoza AP**, Romero A, Montano S, Zunt J and Montgomery J. 2011. Presence of Human Herpes Virus in captive New World Primates in Peru. Poster presentation in: **2011 Wildlife Disease Association International Conference**, Quebec, Canada.
- Rosenbaum M, Núñez J, Lucas C, Ghersi B, **Mendoza AP**, Montano S, Edgel KA, Lescano AG, Zunt J. 2011. Gastrointestinal Parasites in Non-Human Primates (NHPs) with Close Contact to Humans in the Peruvian Amazon. Oral presentation in: **2011 Wildlife Disease Association International Conference**, Quebec, Canada.
- Lujan C, **Mendoza AP**, Gonzales-Viera O, Perales R, Brightsmith D, Montgomery J, Phalen D. 2010. First report of Inclusion-body Hepatitis in a budgerigar in Peru. Poster presentation in: **31st Annual Conference of the Association of Avian Veterinarians.** California, USA.
- **Mendoza AP,** Maves R, Bernal M, Villena M, Brightsmith D. and Montgomery J. 2010. Antibiotic resistant bacterial strains circulating among wild birds sold in the wetmarkets of Peru. Poster presentation in: **2010 International Conference on Emerging Infectious Diseases**. Atlanta, USA.
- Ramos M, Ortiz E, **Mendoza P**, Ghersi B, Cavero N, Montgomery JM. 2010. Knowledge, Attitudes and Practices about Avian Influenza in wild birds and poultry holders at Peruvian Wet Markets. Poster presentation in: **2010 International Conference on Emerging Infectious Diseases.** Atlanta, USA.
- **Mendoza AP,** Ghersi B, Cavero N, Villena M, Lujan C, Ibañez Y, Segovia K, Razuri H, Montgomery J and Brightsmith D. 2010. Avian Influenza and Newcastle Disease in the live bird trade of Perú. Poster presentation in: **2010 Annual Meeting of the Wildlife Disease Association**. Puerto Iguazú, Argentina.
- Lujan C, **Mendoza AP**, Chavez A, Montgomery J and Brightsmith D. 2010. Endoparasites in the live bird markets of Perú. Poster presentation in: **2010 Annual Meeting of the Wildlife Disease Association.** Puerto Iguazú, Argentina.
- **Mendoza AP**, Ghersi B, Koschel T, Montgomery J, Brightsmith DJ. 2009. Avian Influenza in the live bird markets of Peru. Poster presentation in: **58th Annual Meeting of the American Society of Tropical Medicine and Hygiene.** Washington, USA.
- Enciso MA, **Mendoza AP**, Chavez G, Villena M, Chavera A. 2008. Determination of Chytridiomycosis in Amphibians in a Private Conservation Area in Amazonas. Oral presentation in: **Proceedings of the Association of Reptile and Amphibian Veterinarians.** Los Angeles, USA.
- **Mendoza AP**, Elías R, Brightsmith D. 2008 Infectious Diseases in the live-bird trade in Peru. Oral presentation in: **29th Annual Association of Avian Veterinarians Conference.** Georgia, USA.
- Villena M, Chávez G, **Mendoza AP**, Enciso MA. 2008. Isolation of *Aeromonas caviae* on the skin of free-ranging amphibians in the northern Andes of Peru. Poster presentation in: **22nd Annual Meeting of the Society for Conservation Biology**, Chattanooga – TN, USA.
- **Mendoza AP**, Enciso MA, Elías R, Brigthsmith D. 2008. Monitoramento de doenças infecciosas no tráfico de aves selvagens no Perú. Poster presentation in: **Avanços na Medicina de Animais Selvagens - Medicina de Aves, Grupo Fowler.** Curitiba, Paraná. Brazil.
- **Mendoza AP**, 2007. Enfermedades infecciosas en el tráfico de aves silvestres. Oral presentation in: **III Taller del grupo Boliviano contra el tráfico de animales silvestres: Problemas sanitarios relacionados.** Santa Cruz, Bolivia.
- **Mendoza AP**, Céspedes MJ, Gálvez HA, Mayor P. 2005. Serologic study of Leptospiral antibodies in captive collared peccaries (*Tayassu tajacu*) in the Peruvian Amazon. Abstract in: **Ungulate Research Session. Mid-Year TAG Meetings. St Louis Zoo.** Missouri, USA.
- Gálvez H, **Mendoza P**, Céspedes M, Mayor P and Jori F. 2006. The Potential Role of Captive Local Wildlife as a Leptospirosis Reservoir in the Peruvian Amazon. Abstract in: **Proceedings of the 11th International Symposium on Veterinary Epidemiology and Economics.** Cairns, Australia.

- Galvez H, Montoya E, Sánchez N, Schettini L, **Mendoza P.** 2004. Sanidad en el manejo productivo del sajino (*Tayassu tajacu*) en el trópico. Oral presentation: **VI Congreso Internacional sobre Manejo de Fauna Silvestre en la Amazonía y Latinoamérica.** Iquitos, Perú.

AFFILIATIONS

- IUCN SSC Wildlife Health Specialist Group
- Wildlife Disease Association, Latin America Section
- American Association of Zoo Veterinarians
- Peruvian Association of Wildlife Veterinarians
- International Society of Conservation Biology

TEACHING EXPERIENCE

- Student mentoring: Six veterinary students mentored through their thesis work until they successfully obtained the Professional title in Veterinary Medicine at the Universidad Peruana Cayetano Heredia (3), Universidad Científica del Sur (1), Universidad Alas Peruanas (1) and Universidad Nacional Mayor de San Marcos (1).
- Veterinary epidemiology. School of Veterinary Medicine, Universidad Peruana Ricardo Palma. Visiting lecturer 2012, 2013, 2014
- Infectious diseases. School of Veterinary Medicine, Universidad Peruana Ricardo Palma. Visiting lecturer 2013, 2014
- Diploma in Wildlife Management. School of Veterinary Medicine, Universidad Nacional Mayor de San Marcos. Visiting lecturer 2010, 2014, 2016, 2019

LANGUAGES & OTHER SKILLS

- [redacted]

PUBLIC PROFILES

https://www.researchgate.net/profile/Ana_Patricia_Mendoza
https://wcs.academia.edu/PatriciaMendoza
https://pe.linkedin.com/in/patricia-mendoza-59b53017

Collection permits past & present for primates issued by peruvian gov.

RESOLUCIÓN JEFATURAL DE LA RESERVA NACIONAL TAMBOPATA

N° 19-2019-SERNANP-JEF

Puerto Maldonado, 01 de agosto del 2019

VISTO:

El Informe N° 054-2019-SERNANP-RNTAMB/EFG, de fecha 01 de agosto del 2019, a través del cual se evaluó la solicitud presentada por la investigadora Ana Patricia Mendoza Becerra, para realizar investigación científica denominada "***Conservación y Salud de Monos Araña Ateles Chamek Recuperados del Tráfico de Fauna y Reintroducidos en la Reserva Nacional Tambopata y su Zona de Amortiguamiento***", al interior de la Reserva Nacional Tambopata; y,

CONSIDERANDO:

Que, según lo previsto en los incisos g) e i) del artículo 2° de la Ley N° 26834, Ley de Áreas Naturales Protegidas, unos de sus principales objetivos de protección es servir de sustento y proporcionar medios y oportunidades para el desarrollo de la investigación científica;

Que, en concordancia con ello, en el artículo 29° de la precitada Ley, se establece que el Estado reconoce la importancia de las Áreas Naturales Protegidas para el desarrollo de la investigación científica básica y aplicada, siempre que no afecte los objetivos de conservación, se respete la zonificación y las condiciones establecidas en el Plan Maestro;

Que, la actualización del Plan Director de las Áreas Naturales Protegidas, aprobada por Decreto Supremo Nº 016-2009-MINAM, refiere que la investigación científica constituye una herramienta básica para la generación de información que permita mejorar el conocimiento sobre la diversidad biológica, así como para el manejo de recursos naturales y la gestión de riesgos y amenazas;

Que, mediante Decreto Supremo N° 010-2015-MINAM del 23 de setiembre de 2015, se declara de interés nacional el desarrollo de investigaciones al interior de las Áreas Naturales Protegidas de administración nacional, determinándose su gratuidad, así como los procedimientos de aprobación automática y evaluación previa para su otorgamiento;

Que, en el artículo 4° del mencionado Decreto Supremo, se prevé cinco supuestos en los que la autorización de investigación requiere de evaluación previa: a) ingreso a ámbitos de acceso restringido, b) la colecta o extracción de muestras biológicas, c) se

Firmado digitalmente por:
RAMIREZ PRADA Vladimir
FAU 20478053178 hard
Motivo: Doy V° B°
Fecha: 07/08/2019 17:57:05-0500

prevea la alteración del entorno o instalación de infraestructura en el caso de áreas naturales protegidas de administración nacional, d) el uso de equipo o infraestructura perteneciente a las ANP de administración nacional, e) investigación en predios privados;

Que, mediante Resolución Presidencial Nº 287-2015-SERNANP, publicado el 20 de enero de 2016, se aprueban las Disposiciones Complementarias al Reglamento de la Ley de Áreas Naturales Protegidas en materia de investigación, las mismas que establecen las normas y lineamientos que regulan las investigaciones realizadas al interior de las Áreas Naturales Protegidas de administración nacional;

Que, en el artículo 23° de las precitadas Disposiciones Complementarias se establecen los criterios de evaluación del Plan de Investigación;

Que, mediante Resolución Ministerial N° 35-2017-MINAM de fecha 03 de febrero del 2017, modifica, entre otros, el Procedimiento N° 4 del Texto Único de Procedimientos Administrativos - TUPA del SERNANP, aprobado mediante Decreto Supremo N° 002-2012-MINAM, y modificado mediante Resolución Ministerial N° 152-2016-MINAM y Resolución Ministerial N° 315-2016-MINAM;

Que, mediante Resolución Presidencial N° 099-2017-SERNANP, publicado el 18 de abril de 2017, se modifica el proceso GAN-01-10-Otorgamiento de Certificado de Procedencia, asimismo se deja sin efecto la Resolución Presidencial N° 250-2013-SERNANP que aprobó el Certificado de Procedencia de los recursos naturales renovables forestales, flora y/o fauna silvestre provenientes de las Áreas Naturales Protegidas de administración nacional;

Que, a través del documento visto, de fecha 17 de julio del presente año, la investigadora Ana Patricia Mendoza Becerra solicita autorización para realizar investigación científica que incluye: colecta de muestras biológicas y efectuar la investigación en predios privados, en el marco del proyecto denominado ***"Conservación y Salud de Monos Araña Ateles Chamek Recuperados del Tráfico de Fauna y Reintroducidos en la Reserva Nacional Tambopata y su Zona de Amortiguamiento"***, por el periodo de dos (02) años;

Que, mediante Informe N° 054-2019-SERNANP-RNTAMB/EFG, de fecha 01 de agosto del 2019, se evalúa la solicitud presentada, concluyendo otorgar opinión favorable al expediente enviado por la investigadora referente al proyecto de investigación denominado **"Conservación y Salud de Monos Araña Ateles Chamek Recuperados del Tráfico de Fauna y Reintroducidos en la Reserva Nacional Tambopata y su Zona de Amortiguamiento"**, al interior de la Reserva Nacional Tambopata, específicamente se desarrollará la investigación en el ámbito de los Puestos de Vigilancia y Control Sandoval y Briolo y en la Concesión de Conservación Kawsay, por el periodo de dos (02) años; asimismo, el expediente cumple con los requisitos establecidos en el artículo 18° de las Disposiciones Complementarias al Reglamento de la Ley de Áreas Naturales Protegidas en materia de investigación, y que el Plan de Investigación se encuentra conforme a los criterios establecidos en el artículo 23° de las Disposiciones Complementarias en mención;

En uso de las atribuciones conferidas por el numeral 2.1 del artículo 2° del Decreto Supremo N° 010-2015-MINAM, el artículo 14° de las Disposiciones Complementarias al Reglamento de la Ley de Áreas Naturales Protegidas en materia de investigación, aprobadas por Resolución Presidencial Nº 287-2015-SERNANP, y el artículo 27° del Reglamento de Organización y Funciones del SERNANP, aprobado mediante Decreto Supremo Nº 006-2008-MINAM.

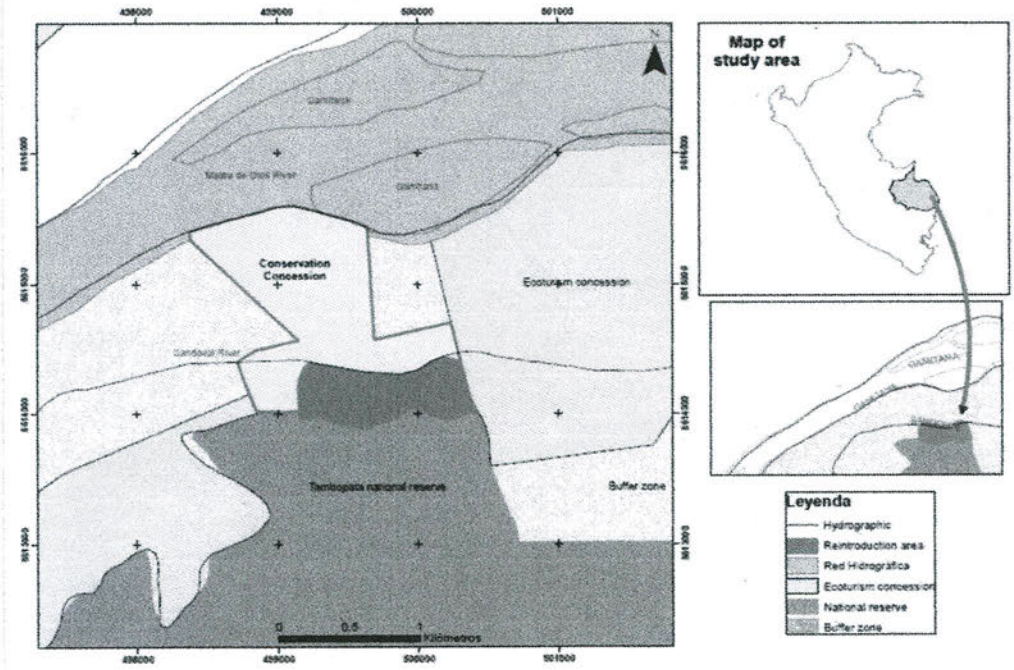
Firmado digitalmente por:
RAMIREZ PRADA Vladimir
FAU 20478053178 hard
Motivo: Doy V° B°
Fecha: 07/08/2019 17:57:37-0500

SE RESUELVE:

Artículo 1°.- Autorizar el desarrollo de la investigación científica con colecta de muestras biológicas y efectuar la investigación en predios privados en el marco del proyecto denominado ***"Conservación y Salud de Monos Araña Ateles Chamek Recuperados del Tráfico de Fauna y Reintroducidos en la Reserva Nacional Tambopata y su Zona de Amortiguamiento"*** a favor de la investigadora Ana Patricia Mendoza Becerra, a ser realizada en el ámbito de la Reserva Nacional de Tambopata por el periodo de dos (02) años, contado a partir de la fecha de emisión de la presente Resolución.

Artículo 2°. - Autorizar el ingreso a la Reserva Nacional Tambopata, específicamente al ámbito de los Puestos de Vigilancia y Control de Sandoval y Briolo; asimismo, en la Concesión de Conservación Kawsay, para el desarrollo de las actividades descritas en el artículo 1° de la presente Resolución, de acuerdo con las coordenadas del cuadro 01:

Cuadro 01



Área de estudio	Coordenadas UTM WGS 84	
Concesión de Conservación Kawsay	500000	8614000

La presente Resolución no autoriza el ingreso a ámbitos ubicados fuera del Área Natural Protegida, así como a su zona de amortiguamiento, debiendo el investigador solicitar las autorizaciones a la entidad correspondiente.

Artículo 3°. – Autorizar el ingreso a la Reserva Nacional Tambopata a las siguientes personas, integrantes del equipo de investigación, de acuerdo con lo indicado en el cuadro N° 02.

Firmado digitalmente por:
RAMIREZ PRADA Vladimir
FAU 20478053178 hard
Motivo: Doy V° B°
Fecha: 07/08/2019 17:57:53-0500

Cuadro N° 02

Nombre y Apellidos	DNI/ PASAPORTE	Nacionalidad	Cargo
Ana Patricia Mendoza Becerra	41131275	Peruana	Responsable
Marieke Hilarides Rosenbaum	594132604	Estadounidense	Colaborador
Raul Bello Santa Cruz	41685808	Peruana	Responsable

Artículo 4°. – Autorizar la colecta de las siguientes muestras biológicas, de acuerdo con lo indicado en el cuadro 03.

Cuadro 03

Nombre científico	Nombre común	Tipo de muestra (ejemplar entero, hojas, flores, plumas, sangre, etc.)	Cantidad	Colecta o Captura temporal (solo para fauna)	Finalidad de la colecta o captura temporal (determinación taxonómica, análisis parasitológico, etc.)
Ateles chamek	Mono araña	• Saliva y heces. • Tejidos y parásitos (en caso de encontrar animales muertos)	40 individuos - múltiples muestras por individuo	Colecta constante de muestras – múltiples muestras por individuo	Examen coproparasitológico, diagnóstico molecular, determinación de niveles hormonales
Alouatta seniculus	Mono aullador rojo	• Saliva y heces. • Tejidos y parásitos (en caso de encontrar animales muertos)	40 individuos - múltiples muestras por individuo	Colecta constante de muestras – múltiples muestras por individuo	Examen coproparasitológico, diagnóstico molecular, determinación de niveles hormonales
Primata	Varios	• Saliva y heces. • Tejidos y parásitos (en caso de encontrar animales muertos)	40 individuos por especie - múltiples muestras por individuo	Colecta constante de muestras – múltiples muestras por individuo	Examen coproparasitológico, diagnóstico molecular, determinación de niveles hormonales

Firmado digitalmente por: RAMIREZ PRADA Vladimir FAU 20478053178 hard
Motivo: Doy V° B°
Fecha: 07/08/2019 17:58:07-0500

No deberán hacer colecta de especies categorizadas en peligro crítico (CR), en peligro (EN), y vulnerable, a menos que no haya posibilidad de realizar una identificación taxonómica precisa en campo.

Se precisa que la autorización no otorga la colecta de especies amenazadas ni especies que no se mencionen en la solicitud presentada; por lo que el investigador deberá tener especial cuidado con la colecta de sus muestras.

Cabe precisar que la presente autorización no otorga derechos sobre los recursos genéticos o productos derivados de las muestras colectadas, por ende, el investigador debe realizar los trámites correspondientes para analizar y exportar las muestras ante la entidad competente.

Artículo 5°. - Los integrantes del equipo de investigación son responsables de conocer y cumplir las disposiciones contenidas en la Ley N° 26834 — Ley de Áreas Naturales Protegidas y su reglamento, aprobado mediante Decreto Supremo N°038-2001-AG, modificado por el Decreto Supremo N°010-2015-MINAM, así como la Resolución Presidencial N° 287-2015-SERNANP. Asimismo, deberá cumplir con las normas que la Jefatura y su personal dispongan durante el desarrollo de la investigación.

Artículo 6°. – La investigadora Ana Patricia Mendoza Becerra, autorizada en el artículo 1° de la presente Resolución, en su calidad de investigador responsable principal asume las siguientes obligaciones y compromisos:

a. Registrar el ingreso y salida de manera obligatoria de los participantes del proyecto en el PVC Más Cercano de los puntos del proyecto, bajo la responsabilidad del investigador autorizado en el artículo 1 de la presente resolución.
b. Dejar copia de la autorización al personal del ANP que lo solicite.
c. No extraer muestras biológicas distintas a las autorizadas.
d. Tramitar el certificado de procedencia, cuando requiera trasladar las muestras de material biológico colectado fuera del ámbito del ANP.
e. Comunicar al SERNANP cualquier nuevo registro para la ciencia, debiendo entregar una copia del nuevo taxón en una institución científica nacional autorizada. La extracción de dichos ejemplares incluyendo los nuevos registros para el ANP deberán ser reportado a la jefatura de ANP (en el puesto de control o sedimento sede administrativa más cercana) para su respectiva consignación en el certificado de procedencia.
f. Gestionar los permisos de exportación ante la autoridad competente, cuando se requiere enviar al extranjero parte del material biológico colectado.
g. Entregar una vez publicado y/o culminada la investigación, una copia física y digital del informe final antes del 31 de julio de 2021 (bajo los términos de la Jefatura) o la publicación a la jefatura de la Reserva Nacional Tambopata y autorizar su registro en la biblioteca digital del SERNANP.

El incumplimiento injustificado de estos compromisos producirá el ingreso del responsable del proyecto a la lista de investigadores inhabilitados para próximas autorizaciones emitidas por el SERNANP.

Artículo 7°.- La autorización a la que se refiere el Artículo 1° caducará automáticamente al vencer el plazo concedido, por el incumplimiento injustificado de los compromisos adquiridos o por cualquier daño al patrimonio natural, sin perjuicio de las responsabilidades administrativas, civiles o penales que pudieran originarse.

Firmado digitalmente por:
RAMIREZ PRADA Vladimir
FAU 20478053178 hard
Motivo: Doy V° B°
Fecha: 07/08/2019 17:58:26-0500

Artículo 8°.- Todas las muestras colectadas serán reportadas a la jefatura de la reserva nacional Tambopata, inmediatamente después de la culminación de las labores de campo en el puesto de Control o sede administrativa más cercana, para emisión del certificado de procedencia correspondiente.

Artículo 9°.- El SERNANP se abstiene de toda responsabilidad por los accidentes o daños que puedan sufrir los integrantes del equipo de investigación durante el desarrollo del proyecto de investigación científica.

Artículo 10°. - Regístrese la presente Resolución en el Módulo de Seguimiento a las autorizaciones de investigación del SERNANP, en el archivo de autorizaciones de la Reserva Nacional de Tambopata y publíquese en la página web del SERNANP (www.sernanp.gob.pe).

Regístrese y comuníquese.

SERNANP

JEFE DE ANP
RESERVA NACIONAL TAMBOPATA

Firmado digitalmente por: RAMIREZ PRADA Vladimir FAU 20478053178 hard
Motivo: Soy el autor del documento
Fecha: 07/08/2019 17:58:51-0500

RESOLUCION JEFATURAL DEL PARQUE NACIONAL DEL MANU
N° 38-2019-SERNANP - JEF

Cusco, 09 de septiembre de 2019

VISTO:

El Informe N° 45-2019-SERNANP-PNM-E-JAMO de fecha 09 de septiembre de 2019, que evalúa la solicitud presentada por Ana Patricia Mendoza Becerra, para realizar la investigación científica que incluye el ingreso a ámbitos de acceso restringido y la extracción de muestras biológicas en el marco del proyecto denominado "Conservación y salud de monos araña (*Ateles chamek*): circulación de herpesvirus y caracterización del microbioma en condiciones de vida libre", en el ámbito del Parque Nacional del Manu, por el periodo de dos (02) años.

CONSIDERANDO:

Que, según lo previsto en los incisos g) e i) del artículo 2° de la Ley N° 26834, Ley de Áreas Naturales Protegidas, unos de sus principales objetivos de protección es servir de sustento y proporcionar medios y oportunidades para el desarrollo de la investigación científica;

Que, en concordancia con ello, en el artículo 29º de la precitada Ley, se establece que el Estado reconoce la importancia de las Áreas Naturales Protegidas para el desarrollo de la investigación científica básica y aplicada, siempre que no afecte los objetivos de conservación, se respete la zonificación y las condiciones establecidas en el Plan Maestro;

Que, la actualización del Plan Director de las Áreas Naturales Protegidas, aprobada por Decreto Supremo Nº 016-2009-MINAM, refiere que la investigación científica constituye una herramienta básica para la generación de información que permita mejorar el conocimiento sobre la diversidad biológica, así como para el manejo de recursos naturales y la gestión de riesgos y amenazas;

Que, mediante Decreto Supremo N° 010-2015-MINAM, publicado el 23 de setiembre de 2015, se declara de interés nacional el desarrollo de investigaciones al interior de las Áreas Naturales Protegidas de administración nacional, determinándose su gratuidad, así como los procedimientos de aprobación automática y evaluación previa para su otorgamiento;

Que, en el artículo 4° del mencionado Decreto Supremo, se prevé cinco supuestos en los que la autorización de investigación requiere de evaluación previa: a) ingreso a ámbitos de acceso restringido, b) la colecta o extracción de muestras biológicas, c) se prevea la alteración del entorno o instalación de infraestructura en el caso de áreas naturales protegidas de administración nacional, d) el uso de equipo o infraestructura perteneciente a las ANP de administración nacional, e) investigación en predios privados;

Que, mediante Resolución Presidencial Nº 287-2015-SERNANP, publicada el 20 de enero de 2016, se aprueban las Disposiciones Complementarias al Reglamento de la Ley de Áreas Naturales Protegidas en materia de investigación, las mismas que establecen las normas y lineamientos que regulan las investigaciones realizadas al interior de las Áreas Naturales Protegidas de administración nacional;

Que, en el artículo 23° de las precitadas Disposiciones Complementarias se establecen los criterios de evaluación del Plan de Investigación;

Que, mediante Resolución Ministerial N° 35-2017-MINAM del 03 de febrero del 2017, modifica, entre otros, el Procedimiento N° 4 del Texto Único de Procedimientos Administrativos – TUPA del SERNANP, aprobado por Decreto Supremo N° 002-2012-MINAM y modificado por Resolución Ministerial N° 152-2016-MINAM y Resolución Ministerial N° 31[illegible]-2016-MINAM;

Que, mediante la Resolución Presidencial N° 099-2017-SERNANP, publicado el 18 de abril de 2017, se modifica el proceso GAN-01-10-Otorgamiento de Certificado de Procedencia, asimismo deja sin efecto la Resolución Presidencial N° 250-2013-SERNANP que aprobó el Certificado de Procedencia de los recursos naturales renovables forestales, flora y/o fauna silvestre provenientes de las Áreas Naturales Protegidas de administración nacional;

Que, mediante Resolución Ministerial N° 240-2015-MC, el Ministerio de Cultura aprobó el "Protocolo de actuación ante el hallazgo, avistamiento o contacto con pueblos indígenas en aislamiento y para el relacionamiento con pueblos indígenas en situación de contacto inicial", norma que tiene por finalidad "evitar o reducir los riesgos sobrevinientes a una situación de hallazgo, avistamiento o contacto con un pueblo indígena en aislamiento o ante una situación de relacionamiento con un pueblo indígena en situación de contacto inicial, y de ser el caso, atender las emergencias sobrevinientes a éstas;

Que, mediante Resolución Ministerial N° 799-2007/MINSA, el Ministerio de Salud aprobó la "Norma Técnica de Salud: Prevención, Contingencia ante el Contacto y Mitigación ante el Contacto y Mitigación d3e Riesgos para la Salud en escenarios con presencia de Indígenas en Aislamiento y en Contacto Inicial" (en adelante. NTS PIACI), la cual tiene por finalidad "protegerla salud de los Indígenas en Aislamiento (IA) y preparar al personal de salud para actuar en caso suceda algún avistamiento o contacto con IA e implementen acciones oportunas y eficaces con calidad humana y técnica y de respeto a su cultura y autodeterminación;

Que, a través del documento del visto, Ana Patricia Mendoza Becerra, solicita autorización para realizar investigación científica que incluye el ingreso a ámbitos de acceso restringido y la extracción de muestras biológicas en el marco del proyecto denominado "Conservación y salud de monos araña (*Ateles chamek*): circulación de herpesvirus y caracterización del microbioma en condiciones de vida libre", en el ámbito del Parque Nacional del Manu, por el periodo de dos (02) años;

Que, mediante Informe N° 45-2019-SERNANP-PNM-E-JAMO de fecha 09 de septiembre de 2019, se evalúa la solicitud presentada, concluyendo que el expediente cumple con los requisitos establecidos en el artículo 18° de las Disposiciones Complementarias al Reglamento de la Ley de Áreas Naturales Protegidas en materia de investigación, y que el Plan de Investigación se encuentra conforme a los criterios establecidos en el artículo 23° de las Disposiciones Complementarias en mención;

En uso de las atribuciones conferidas por el numeral 2.1 del artículo 2° del Decreto Supremo N° 010-2015-MINAM, el artículo 14° de las Disposiciones Complementarias al Reglamento de la Ley de Áreas Naturales Protegidas en materia de investigación, aprobadas por Resolución Presidencial Nº 287-2015-SERNANP, y el artículo 27° del Reglamento de Organización y Funciones del SERNANP, aprobado mediante Decreto Supremo Nº 006-2008-MINAM.

SE RESUELVE:

Artículo 1°.- Autorizar el desarrollo de la investigación científica denominada "Conservación y salud de monos araña (*Ateles chamek*): circulación de herpesvirus y caracterización del microbioma en condiciones de vida libre" a favor de Ana Patricia Mendoza Becerra, a ser realizada en el ámbito de la Estación Biológica de Cocha Cashu al interior del Parque Nacional del Manu, por el periodo de dos (02) años, contado a partir de la fecha de emisión de la presente Resolución.

Artículo 2°.- Autorizar el ingreso al Parque Nacional del Manu a las siguientes personas, integrantes del equipo de investigación:

Nombres y Apellidos	Documento de identidad	País de Procedencia	Cargo	Institución
Ana Patricia Mendoza Becerra	41131275	Perú	Responsable	Kawsay Biological Station
Marieke Hiladires Rosenbaum	594132603	Estados Unidos	Colaborador	Kawsay Biological Station
Raúl Bello Santa Cruz	41685808	Perú	Responsable	Kawsay Biological Station
Roxana Patricia Arauco Aliaga	10352911	Perú	Colaborador	Estación Biológica de Cocha Cashu
Yannet Rocio Quispe Delgado	70576211	Perú	Colaborador	Estación Biológica de Cocha Cashu
Nuria Lucero Apaza Quispe	73832461	Perú	Colaborador	Estación Biológica de Cocha Cashu
Karla Gabriela Ramírez Capetillo	70364458	Perú	Colaborador	Estación Biológica de Cocha Cashu
Gabriela del Pilar Polo Espinoza	70666516	Perú	Colaborador	Estación Biológica de Cocha Cashu
Fortunato Rayan Perez	46606719	Perú	Colaborador	Estación Biológica de Cocha Cashu

Artículo 3°.- Autorizar la colecta de muestras biológicas, de acuerdo a lo indicado en los siguientes cuadros.

Cuadro N° 01

Orden	Tipo de muestras	Cantidad
Primates	Saliva	80 muestras
	Heces	
	Tejidos y Parásitos (en caso de encontrar animales muertos)	

Precisar que la presente autorización no permite la colecta de especímenes de primates ni otorga derechos sobre los recursos genéticos o productos derivados de las muestras colectadas.

Artículo 4°.- Los integrantes del equipo de investigación son responsables de conocer y cumplir las disposiciones contenidas en la Ley Nº 26834, Ley de Áreas Naturales Protegidas, y su Reglamento, aprobado mediante Decreto Supremo Nº 038-2001-AG, modificado por Decreto Supremo N° 010-2015-MINAM, así como en la Resolución Presidencial N° 287-2015-SERNANP. Asimismo, los investigadores deberán cumplir con las normas que la Jefatura y su personal dispongan durante el desarrollo de la investigación.

Artículo 5°.- Debido a la geografía accidentada de la zona la cual determina un alto riesgo para la seguridad e integridad personal, el Servicio Nacional de Áreas Naturales Protegidas por el Estado – SERNANP - Parque Nacional del Manu no se responsabiliza por accidentes o daños a los que pudieran estar expuestos los integrantes del grupo de investigación durante la ejecución del proyecto

Artículo 6°.- Ana Patricia Mendoza Becerra, autorizado en el artículo 1° de la presente Resolución, en su calidad de investigador principal asume las siguientes obligaciones y compromisos:

a. Presentar copia de la presente autorización al personal del ANP que lo solicite.
b. No extraer muestras biológicas distintas a las autorizadas.
c. Tramitar el certificado de procedencia, cuando se requiera trasladar las muestras de material biológico colectado fuera del ámbito del ANP
d. Comunicar al SERNANP cualquier nuevo registro para la ciencia, debiendo entregar una copia del depósito del holotipo del nuevo taxa en una institución científica nacional autorizada. La extracción de dichos ejemplares incluyendo los nuevos

registros para el ANP deberán ser reportados a la Jefatura de ANP (en el Puesto de Control o sede administrativa más cercana) para su respectiva consignación en el certificado de procedencia.

e. Gestionar los permisos de exportación ante la autoridad competente, cuando se requiera enviar al extranjero parte del material biológico colectado.
f. Entregar una vez publicado los resultados de la investigación, una copia digital del informe o la publicación al SERNANP y autorizar su registro en la biblioteca digital del SERNANP.
g. Entregar a la jefatura del ANP un informe final de la investigación, incluye versión en digital conteniendo material fotográfico.
h. No utilizar las muestras biológicas con fines de acceso a recursos genéticos o sus productos derivados; así como, no utilizar los conocimientos colectivos vinculados a los recursos biológicos de pueblos indígenas; sin contar con el contrato de acceso correspondiente.
i. Cumplir con el "Protocolo de actuación ante el hallazgo, avistamiento o contacto con pueblos indígenas en aislamiento y para el relacionamiento con pueblos indígenas en situación de contacto inicial".
j. Cumplir con lo establecido en la Norma y Guías técnicas para atención y contingencia con PIACI del Ministerio de Salud, 2007, en donde se prevé un protocolo de vacunación a cumplir para personas que se relacionen con pueblos indígenas en situación de contacto inicial y/o transiten áreas con presencia de pueblos indígenas en situación de aislamiento. El cumplimiento del protocolo es demostrable en un carné o tarjeta de vacunación, el cual contendrá fecha de aplicación y vigencia de las siguientes vacunas: **influenza del año en curso, difteria tetano (DT), hepatitis B. fiebre amarilla y sarampión.**

El incumplimiento injustificado de estas obligaciones y compromisos producirá el ingreso del investigador en la lista de investigadores inhabilitados para próximas autorizaciones emitidas por el SERNANP.

Artículo 7°.- La autorización a la que se refiere el Artículo 1° caducará automáticamente al vencer el plazo concedido, por el incumplimiento injustificado de los compromisos adquiridos o por cualquier daño al patrimonio natural, sin perjuicio de las responsabilidades administrativas, civiles o penales que pudieran originarse.

Artículo 8°.- Todas las muestras colectadas serán reportadas a la jefatura del Parque Nacional del Manu, inmediatamente después de la culminación de las labores de campo en el Puesto de Control o Sede Administrativa más cercana, para la emisión del certificado de procedencia correspondiente.

Artículo 9°.- El SERNANP se abstiene de toda responsabilidad por los accidentes o daños que puedan sufrir los integrantes del equipo de investigación durante el desarrollo del proyecto de investigación científica.

Artículo 10°.- Regístrese la presente Resolución en el Modulo de Seguimiento a las autorizaciones de investigación del SERNANP, en el archivo de autorizaciones del Parque Nacional del Manu y publíquese en la página web del SERNANP (www.sernanp.gob.pe).

Regístrese y comuníquese.

MINISTERIO DEL AMBIENTE - Servicio Nacional de Áreas Naturales Protegidas por el Estado - PARQUE NACIONAL DEL MANU

Ing. Ernesto John Flores Leiva
Jefe del Parque Nacional del Manu
Servicio Nacional de Áreas Naturales Protegidas por el Estado
SERNANP

REPÚBLICA DEL PERÚ

RESOLUCIÓN DE DIRECCIÓN GENERAL
N° 213 -2016-SERFOR-DGGSPFFS

Lima, 10 JUN 2016

VISTO:

La solicitud mediante la cual el señor Néstor Francisco Allgas Marchena solicita adenda a la Resolución de Dirección General N° 173-2016-SERFOR-DGGSPFFS y el Informe Técnico N° 0544-2016-SERFOR/DGGSPFFS-DGSPFS de fecha 07 de Junio de 2016;

CONSIDERANDO:

Que, el Artículo VIII de la Ley N° 27444, Ley del Procedimiento Administrativo General, indica que las autoridades administrativas no podrán dejar de resolver las cuestiones que se les propongan, por deficiencia de sus fuentes, en tales casos acudirán a los principios del procedimiento administrativo previstos en la Ley;

Que, el artículo IV, numeral 1.3 de la Ley N° 27444, señala que las autoridades deben dirigir e impulsar de oficio el procedimiento y ordenar la realización o práctica de los actos que resulten convenientes para el esclarecimiento y resolución de las cuestiones necesarias;

Que, de acuerdo al Artículo IV, numeral 2, se indica que los principios señalados en los párrafos anteriores, servirán también de criterio interpretativo para resolver las cuestiones que puedan suscitarse en la aplicación de las reglas de procedimiento, como parámetros para la generación de otras disposiciones administrativas de carácter general, y para suplir los vacíos en el ordenamiento administrativo;

Que, mediante el Decreto Supremo N° 007-2013-MINAGRI, modificado por el Decreto Supremo N° 016-2014-MINAGRI, se aprobó el Reglamento de Organización y Funciones - ROF del Servicio Nacional Forestal y de Fauna Silvestre - SERFOR, el mismo que en su literal "g" del artículo 53°, señala como una de las funciones de la Dirección General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre, la de otorgar permisos de investigación o de difusión cultural con o sin colecta de flora y fauna silvestre y sus recursos genéticos;

Que, mediante Resolución Ministerial 424-2014-MINAGRI, se da por concluido el proceso de transferencia de la Dirección General Forestal y de Fauna Silvestre al Servicio Nacional Forestal y de Fauna Silvestre – SERFOR, así como el proceso de fusión por absorción, entre otros;

Que, mediante Resolución de Dirección Ejecutiva N° 031-2014-SERFOR-DE del 02 de octubre del 2014, emitida por el Servicio Nacional Forestal y de Fauna Silvestre – SERFOR, se designó al Blgo. Mirbel Alberto Epiquién Rivera, las funciones de Director General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre del Servicio Nacional Forestal y de Fauna Silvestre – SERFOR;

Que, mediante Resolución de Dirección General Resolución de Dirección General N° 173-2016-SERFOR-DGGSPFFS, de fecha 05 de Mayo de 2016, se autorizó al señor Néstor Francisco Allgas Marchena, realizar la investigación científica en fauna silvestre fuera de áreas naturales protegidas, con captura temporal de individuos de *Oreonax flavicauda, Aotus miconax* y *Callicebus oenanthe* para la toma de hasta treinta (30) muestras de tejido y suero sanguíneo, heces, ectoparásitos e hisopados

(orales, nasales, traqueales y cloacales) por espécimen, a realizarse en los departamentos de Amazonas, San Martín, Cajamarca, Loreto, La Libertad y Huánuco; solicitado como parte del proyecto titulado "Distribución Ecología y estado de Conservación de los primates endémicos del Perú, Quinta Etapa", por el período de cinco (05) años;

Que, mediante Carta S/N, recibida el 31 de Mayo del 2016, presentada a la Dirección General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre del Servicio Nacional Forestal y de Fauna Silvestre - SERFOR, suscrita por el señor Néstor Francisco Allgas Marchena, mediante el cual solicita adenda a la Resolución de Dirección General N° 173-2016-SERFOR-DGGSPFFS (05.05.2016);

Que, el Informe Técnico del visto, emitido por la Dirección de Gestión Sostenible del Patrimonio de Fauna Silvestre del Servicio Nacional Forestal y de Fauna Silvestre - SERFOR, concluye que la colecta de muestras biológicas, es de suma importancia para cumplir los objetivos planteados en el proyecto, ya que permitirá diagnosticar enfermedades infecciosas que se encuentran afectando no sólo a las especies endémicas, sino también a todas las especies de primates que han sido recuperadas del tráfico o tenencia ilegal, y que se encuentra actualmente en cautiverio, por lo que se recomienda aprobar la solicitud del señor Néstor Francisco Allgas Marchena, investigador responsable del proyecto: "Distribución, ecología y estado de conservación de los primates endémicos del Perú, Quinta Etapa";

En uso de las atribuciones conferidas por el artículo 53° del Reglamento de Organización y Funciones del Servicio Nacional Forestal y de Fauna Silvestre – SERFOR, aprobado por Decreto Supremo 007-2013-MINAGRI y modificado por el Decreto Supremo N° 016-2014-MINAGRI; el mismo que en su inciso g) precisa como funciones de la Dirección General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre, la de otorgar permisos de investigación o de difusión cultural con o sin colecta de flora y fauna silvestre;

SE RESUELVE:

Artículo 1°.- Incorporar al estudio, la colecta de muestras biológicas de especímenes en cautiverio de las especies de primates pertenecientes a las familias Atelidae, Aotidae, Pitheciidae, Callitrichidae y Cebidae, como parte del proyecto "Distribución, ecología y estado de conservación de los primates endémicos del Perú, Quinta Etapa", aprobado bajo la Resolución de Dirección General N° 173-2016-SERFOR-DGGSPFFS (05.05.2016).

Artículo 2°.- Dejar subsistente la Autorización N° AUT-IFS-2016-019 señalado en la Resolución de Dirección General N° 0173-2016-SERFOR-DGGSPFFS, de fecha 05 de Mayo del 2016, así como los lineamientos y demás compromisos indicados en la misma.

Artículo 3°.- Los investigadores deberán coordinar previamente con las autoridades o representantes de los Centros de Cría en Cautiverio, para el ingreso a sus instalaciones y la colecta de las muestras. Asimismo, de ser encontrados especímenes muertos, éstos deberán ser declarados ante la Administración Técnica Forestal y de Fauna Silvestre del SERFOR a fin de registrar la ocurrencia y condiciones del hallazgo y la posterior colecta.

Artículo 4°.- Notificar la presente Resolución de Dirección General al señor Néstor Francisco Allgas Marchena y transcribirla a la Dirección General de Información y Ordenamiento Forestal y de Fauna Silvestre del SERFOR, a la Autoridad Regional Ambiental de San Martín, Gerencia de Recursos Naturales y Gestión Ambiental de Huánuco, Programa Regional de Manejo de Recursos Foretsales y de Fauna Silvestre de Loreto y la Gerencia Regional del Ambiente de La Libertad.

REPÚBLICA DEL PERÚ

Artículo 5º.- Disponer la publicación de la presente Resolución en el Portal Web del Servicio Nacional Forestal y de Fauna Silvestre: www.serfor.gob.pe.

Regístrese y comuníquese

Blgo. Mirbel Alberto Epiquién Rivera
Director General
Dirección General de Gestión Sostenible del
Patrimonio Forestal y de Fauna Silvestre
Servicio Nacional Forestal y de Fauna Silvestre - SERFOR

REPÚBLICA DEL PERÚ

RESOLUCIÓN DE DIRECCIÓN GENERAL
Nº 173 -2016-SERFOR/DGGSPFFS

Lima, 05 MAY 2016

VISTO:

La solicitud presentada el 18 de Marzo del 2016, el señor Néstor Francisco Allgas Marchena, investigador de la Asociación Neotropical Primate Conservation Perú, quien solicitó autorización para realizar investigación científica de fauna silvestre fuera de áreas naturales protegidas en los departamentos de Amazonas, San Martín, Cajamarca, Loreto, La Libertad y Huánuco, como parte del estudio titulado "Distribución Ecología y estado de Conservación de los primates endémicos del Perú, Quinta Etapa", y;

CONSIDERANDO:

Que, el artículo 66° de la Constitución Política del Perú, establece que los recursos naturales, renovables y no renovables, son patrimonio de la Nación. El Estado es soberano en su aprovechamiento; asimismo, en su artículo 68° establece que es obligación del Estado promover la conservación de la diversidad biológica;

Que, la Ley Nº 26821, Ley Orgánica para el Aprovechamiento Sostenible de los Recursos Naturales, establece en su artículo 9º, referido a la investigación científica, que el Estado promueve la investigación científica y tecnológica sobre la diversidad, calidad, composición, potencialidad y gestión de los recursos naturales. Asimismo, promueve la información y el conocimiento sobre los recursos naturales. Para estos efectos, podrán otorgarse permisos para investigación en materia de recursos naturales;

Que, mediante Decreto Legislativo N° 997, Decreto Legislativo que aprueba la Ley de Organización y Funciones del Ministerio de Agricultura, ahora Ministerio de Agricultura y Riego, modificado por la Ley N° 30048, dispone que este Ministerio es el órgano rector del Sector Agrario, el cual comprende entre otras: las tierras de uso agrícola, de pastoreo, las tierras forestales, las eriazas con aptitud agraria; los recursos forestales y su aprovechamiento; la flora y fauna; las actividades de producción, transformación y de comercialización de cultivos y crianzas; asimismo, dispone, entre otros, que este Ministerio diseña, establece, ejecuta y supervisa las políticas nacionales y sectoriales en materia agraria; ejerce la rectoría en relación con ella y vigila su obligatorio cumplimiento por los tres niveles de gobierno;

Que, el artículo 13 de la Ley N° 29763, crea el Servicio Nacional Forestal y de Fauna Silvestre-SERFOR, como organismo público técnico especializado, con personería jurídica de derecho público interno, como pliego presupuestal adscrito al Ministerio de Agricultura y Riego. Asimismo, se señala que el SERFOR es la autoridad nacional forestal y de fauna silvestre, ente rector del Sistema Nacional de Gestión Forestal y de Fauna Silvestre (SINAFOR), y se constituye en su autoridad técnico normativa a nivel nacional, encargada de dictar las normas y establecer los procedimientos relacionados a su ámbito;

Que, mediante Decreto Supremo N° 007-2013-MINAGRI, del 18 de Julio de 2013 y modificado por Decreto Supremo N° 016-2014-MINAGRI del 3 de Setiembre de 2014, aprobó el Reglamento de Organización y Funciones - ROF del Servicio Nacional Forestal y de Fauna Silvestre - SERFOR, el mismo que en su literal g) del artículo 53°, señala como una de las funciones de la Dirección General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre, la de otorgar permisos de investigación o de difusión cultural con o sin colecta de flora y fauna silvestre y sus recursos genéticos; y el literal "i" del artículo 56° señala como una de las funciones de la Dirección de Gestión Sotenible del Patrimonio de Fauna Silvestre el autorizar la extracción de especímenes de fauna silvestre y microorganismos con fines de investigación;

Que, mediante Decreto Supremo N° 019-2015-MINAGRI, se aprobó el Reglamento para la Gestión de la Fauna Silvestre, el mismo que en su artículo 134°, numeral 134.1°, menciona que la investigación científica del Patrimonio se aprueba mediante autorizaciones, salvaguardando los derechos del país, respecto a su patrimonio genético nativo. Asimismo, el numeral 134.5° de la citada norma, señala que el desarrollo de actividades de investigación básica taxonómica de fauna silvestre, relacionada con estudios moleculares con fines taxonómicos, sistemáticos, filogeográficos, biogeográficos, evolutivos y de genética de la conservación, entre otras investigaciones sin fines comerciales, son aprobadas mediante autorizaciones de investigación científica;

Que, el Decreto Supremo N° 004-2014-MINAGRI, aprueba la actualización de la lista de clasificación y categorización de las especies amenazadas de fauna silvestre legalmente protegidas por el estado Peruano;

Que, mediante Resolución de Dirección Ejecutiva N° 031-2014-SERFOR-DE, emitida por el Servicio Nacional Forestal y de Fauna Silvestre – SERFOR, se encargó al Blgo. Mirbel Alberto Epiquién Rivera las funciones de Director General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre del Servicio Nacional Forestal y de Fauna Silvestre – SERFOR;

Que, el informe técnico Nº 0434-2016-SERFOR/DGGSPFFS-DGSPFS, de fecha 28 de Abril del 2016, emitido por la Dirección de Gestión Sostenible del Patrimonio de Fauna Silvestre, menciona que en el estudio no realizarán colectas de especímenes a excepción de despojos de fauna debidamente justificados; asimismo plantea la captura temporal y colecta de muestras biológicas de *Oreonax flavicauda, Aotus miconax* y *Callicebus oenanthe* en cautiverio;

Que, el precitado informe concluye que i) la investigación no representa una amenaza para la especie en estudio, ya que las pautas metodológicas y las consideraciones técnicas del proyecto son las apropiadas, ii) la investigación reviste de importancia ya que brindaría información sobre el estado actual de las poblaciones de *Oreonax flavicauda, Aotus miconax* y *Callicebus oenanthe* en sus áreas de distribución, así como datos sobre su ecología, alimentación, enfermedades e información para implementar un protocolo de manejo de primates rescatados, la cual servirá de sustento para el desarrollo e implementación de planes de acción para su conservación, iii) el expediente materia de resolución cumple con presentar la documentación necesaria y recomienda se apruebe la solicitud del señor Néstor Francisco Allgas Marchena;

REPÚBLICA DEL PERÚ

En uso de las atribuciones conferidas por el artículo 53º del Reglamento de Organización y Funciones del Servicio Nacional Forestal y de Fauna Silvestre-SERFOR, aprobado por Decreto Supremo Nº 007-2013-MINAGRI, el mismo que en su literal "g" del mencionado artículo señala como una de las funciones de la Dirección General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre, la de otorgar permisos de investigación o de difusión cultural con o sin colecta de flora y fauna silvestre y sus recursos genéticos.

SE RESUELVE:

Artículo 1º.- Otorgar la autorización con fines de investigación científica de fauna silvestre fuera de áreas naturales protegidas al señor Néstor Francisco Allgas Marchena, correspondiéndole el código de Autorización N° AUT-IFS-2016-019.

Articulo 2°.- La autorización indicada en el artículo precedente, incluye la captura temporal de *Oreonax flavicauda, Aotus miconax* y *Callicebus oenanthe* para la toma de hasta treinta (30) muestras de tejido y suero sanguíneo, heces, ectoparasitos e hisopados (orales, nasales, traqueales y cloacales) por especimen; a realizarse en los departamentos de Amazonas, San Martin, Cajamarca, Loreto, La Libertad y Huánuco; solicitado como parte del proyecto titulado "Distribución Ecología y estado de Conservación de los primates endémicos del Perú, Quinta Etapa", por el periodo de cinco (05) años.

NOMBRE	FUNCIÓN	Nacionalidad	Documento de identidad
Néstor Francisco Allgas Marchena	Responsable	Peruano	DNI 40325593
Sandra Lucia Almeyda Zambrano	Colaboradora	Peruana	DNI 43735083
Sam Shanee	Colaborador	Británico	CE 001082271
Noga Shanee	Colaboradora	Israelí	CE 000976418
Ana Patricia Mendoza	Colaboradora	Peruana	DNI 41131275

Artículo 3º.- El titular de la autorización y los investigadores señalados en el artículo precedente se comprometen a:

a) Capturar y colectar únicamente los especímenes y/o muestras biológicas autorizados.
b) No ceder el material colectado a terceros, ni utilizarlo para fines distintos a lo autorizado.
c) Si por razones científicas acotadas, se requiere enviar al extranjero parte del material colectado, los interesados deberán gestionar el correspondiente Permiso de Exportación ante la Dirección General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre del SERFOR, así como pasar el control respectivo.
d) No contactar, ni ingresar a los territorios comunales sin contar con la autorización de las autoridades comunales correspondientes.
e) Entregar a la Dirección General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre una (01) copia del Informe Parcial (incluyendo versión digital), al término de cada año, contados a partir del dia siguiente de la notificación de la presente autorización. Asimismo, entregar una (01) copia de la(s) publicacione(s) producto de la investigación realizada en formato impreso y digital (de ser el caso).
f) Entregar a la Dirección General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre, una (01) copia del Informe Final (incluyendo versión digital) como resultado de la autorización otorgada, copias del material fotográfico y/o slides que puedan ser utilizadas para difusión. Asimismo, entregar una (01) copia de la(s) publicacione(s) producto de la investigación realizada en formato impreso y digital.

g) Los Informes Parciales e Informe Final final deberán contener una lista taxonómica de las especies de fauna y flora colectadas o registradas bajo la presente autorización, en formato MS Excel. Ésta lista deberá contar con sus respectivas coordenadas en formato UTM (Datum WGS84), incluyendo la zona (17, 18 ó 19). El formato de Informe Parcial y Final que debe ser usado se encuentra en el Anexo 1 de la presente resolución.
h) La entrega de lo indicado en el literal f), no deberá tomar un plazo mayor a los seis (06) meses al vencimiento de la presente autorización.
i) No ingresar a las Áreas Naturales Protegidas ni a sus Zonas de Amortiguamiento sin contar con la autorización respectiva.
j) Indicar el número de la Resolución en las publicaciones generadas a partir de la autorización concedida.

Artículo 4°.- El incumplimiento de los compromisos adquiridos será causal para denegar futuros actos administrativos a nivel institucional, sin perjuicio de ejercer las acciones civiles y penales que correspondan.

Artículo 5°.- El proceso de colecta de muestras biológicas lo debe realizar un Médico Veterinario, que asegure las medidas de bioseguridad pertinentes, así como tener en consideración el bienestar animal en los especímenes a ser manipulados. Asimismo el investigador podrá colectar despojos de fauna (pelo, huesos, fragmentos de piel, etc.) producto de la muerte natural de los especímenes en estudio, toda vez que sean debidamente corroborados mediante documentación oficial.

Artículo 6°.- La Dirección General de Gestión Sostenible del Patrimonio Forestal y de Fauna Silvestre no se responsabiliza por accidentes o daños sufridos por el solicitante y los investigadores mencionados en el artículo 2°, durante la ejecución del proyecto. Asimismo, se reserva el derecho de demandar del proyecto de investigación los cambios a que hubiese lugar en los casos en que se dicten nuevas disposiciones legales o se formulen ajustes sobre la presente autorización.

Artículo 7°.- Notificar la presente Resolución al señor Néstor Francisco Allgas Marchena y transcribirla a la Dirección General de Información y Ordenamiento Forestal y de Fauna Silvestre, y a la Autoridad Regional de las dependencias de Huánuco, San Martín, Loreto y La Libertad.

Artículo 8°.- Disponer la publicación de la presente Resolución en el Portal Web del Servicio Nacional Forestal y de Fauna Silvestre: www.serfor.gob.pe.

Regístrese y comuníquese

Ing. Sara Ruth Yalle Paredes
Directora General (e)
Dirección General de Gestión Sostenible del
Patrimonio Forestal y de Fauna Silvestre
Servicio Nacional Forestal y de Fauna Silvestre - SERFOR

REPÚBLICA DEL PERÚ

ANEXO 1

FORMATO DE INFORME DE INVESTIGACIÓN (PARCIAL o FINAL)

Una vez culminada la investigación autorizada, o al término de un período anual, los investigadores responsables deberán revisar el cumplimiento de los compromisos asumidos, teniendo en cuenta lo siguiente:

1) Entregar a la DGGSPFFS del SERFOR una (01) copia del informe parcial o final en idioma español, como resultado de la autorización otorgada, en formato impreso y soporte digital (CD), para ello adjunto el formato de informe a presentar:

a.	Título del Proyecto.
b.	Área estudiada (indicando coordenadas geográficas para todas las zonas de colecta).
c.	Nº de Autorización.
d.	Autores.
e.	Institución.
f.	Resumen para ser publicado en la web del SERFOR (donde se deberá señalar los resultados y la relevancia de lo encontrado en forma sintetizada)
g.	Marco teórico.
h.	Material y Métodos.
i.	Resultados.
j.	Discusión.
k.	Conclusiones.
l.	Bibliografía.
m.	Anexos

2) Entregar copias del material fotográfico y/o slides que puedan ser utilizadas para difusión institucional no comercial.

3) Entregar copia de la(s) publicación(es), producto de la investigación realizada en formato impreso y digital, o de lo contrario señalar que no cuenta con publicación alguna en la remisión de su carta.

4) Presentar la lista taxonómica de las especies de fauna y/o flora encontradas en las zonas evaluadas con las respectivas coordenadas formato UTM (Datum WGS84), incluyendo la zona (17, 18 ó 19). Dicha información deberá ser presentada en un cuadro en formato Excel.

5) Además, se deberá adjuntar copias de las constancias de depósito del material biológico y de ser el caso, copias de los permisos de exportación otorgados (para el caso de autorización con colecta).

MARIEKE HILARIDES ROSENBAUM
[redacted]

1003
94-221/1212
3500

9/30/19
Date

Pay to the Order of U.S. Fish & Wildlife Service $ 100.00

One Hundred Dollars and 00/100 Dollars

Photo Safe Deposit® Details on back

charles SCHWAB BANK
Charles Schwab Bank
Henderson, NV

High Yield Investor Checking

For SITES import. perm. app.

[redacted]

[EXTERNAL] Re: CITES Permit App 56679D

Marieke Rosenbaum <marieke.rosenbaum@tufts.edu>

Sat 4/25/2020 2:36 PM

To: Cate, Emily B <emily_cate@fws.gov>

4 attachments (704 KB)

Rosenbaum CITES Permit No 56679D.doc; G2017-42 final.docx; Rosenbaum G2017-42 #1 final.doc; Rosenbaum G2017-42 11.18.2019.pdf;

Dear Emily,

Please see attached a letter explaining the information you have requested. I have also attached IACUC documentation. Please note that the IACUC expired this month and we are working to submit another application before conducting any additional primate sampling.

Thank you for your time.

Sincerely,
Marieke

On Fri, Mar 13, 2020 at 12:33 PM Cate, Emily B <emily_cate@fws.gov> wrote:

> **Dear Dr. Rosenbaum,**
>
> **I have your application dated 09/30/2019, received 10/07/2019, regarding the proposed import of biological specimens of Peruvian Neotropical primates. I apologize for the delay in processing your application.**
>
> **Please provide the following information so that I can continue to process your application:**
>
> 1. **Please clarify if and how any remuneration, either financial or in-kind, was provided for the collection of samples.**
> 2. **Did any mortalities or injuries occur due to the collection of the samples for the animals already sampled invasively at the rescue centers?**
> 3. **For the animals sampled invasively/proposed for future samples at the rescue centers, was the collection done/is the collection proposed to be done as part of routine general husbandry practices or were the animals/will the animals be anesthetized specifically to collect the samples? Please also elaborate on the methods used to anesthetize the animals.**
>
> **In accordance with 50 CFR 13.11(e), if the requested information is not received by this office by April 27, 2020, your application will be abandoned and administratively closed. Once a file is closed you will need to submit a new application and all required fees for the Service to consider your proposed activity. Please refer to permit number 56679D in your correspondence.**
>
> **Respectfully,**
> **Emily**
>
> **Emily Cate** | Permits Biologist
> U.S. Fish and Wildlife Service | International Affairs

Division of Management Authority | Branch of Permits
5725 Leesburg Pike, MS:IA
Falls Church, VA 22041-3803

--

Marieke H. Rosenbaum, DVM, MPH, MS
Assistant Professor, Dept of Infectious Disease and Global Health
Cummings School of Veterinary Medicine at Tufts University
200 Westboro Road | North Grafton, MA 01536
Marieke.Rosenbaum@tufts.edu | 617.605.9089

Tufts UNIVERSITY | Cummings School of Veterinary Medicine

Department of Infectious Disease and Global Health

April 25th 2020

Re: CITES Permit App 56679D

Dear Ms. Emily Cate, Permits Biologist;

Thank you for reviewing my application (#56679D) for a CITES permit for importation of biological specimens of Peruvian Neotropical primates. Below is a list of the additional information you requested to continue to process our application.

1. **Comment:** Please clarify in and how any renumeration, either financial or in-kind, was provided for the collection of samples.

   Response: No renumeration either financial or in-kind was provided for the collection of samples and no renumeration will be provided for the future collection of samples.

2. **Comment:** Did any mortalities or injuries occur due to the collection of the samples for the animals already sampled invasively at the rescue centers?

   Response: No mortalities or injuries have occurred due to the collection of samples to date.

3. **Comment:** For the animals sampled invasively/proposed for future samples at the rescue centers, was the collection done/is the collection proposed to be done as part of routine general husbandry practices or were the animals/will the animals be anesthetized specifically to collect the samples? Please also elaborate on the methods used to anesthetize the animals.

   Response: All sample collection was conducted as part of routine general health exams and the animals were not anesthetized specifically to collet samples. However, we have been operating in accordance with an IACUC approved protocol via Tufts University IACUC (#G2017-42). This IACUC expired in April of this year, and we are preparing a new protocol for continued approval and plan to continue sampling once it is safe to travel and conduct field work again, pending the COVID-19 pandemic. Below are the details of our anesthetic protocol and I have attached to my email the necessary documentation from our IACUC protocol.

200 Westboro Road, North Grafton, MA 01536
TEL: 508.887.4374 | FAX: 508.839.7911

Anesthesia	Xylazine 0.5 mg/kg IM, Ketamine 10-20mg/kg IM, Midazolam 0.05-0.1mg/kg IM
Methods used to monitor anesthetic depth	Palpebral reflex, eye position, pain response (toe pinch), heart rate, mucus membrane color, temperature
All animals are monitored continuously while under anesthesia.	

Please let me know if any additional information is required and thank you for your time processing this permit application.

Sincerely,

Marieke Rosenbaum, DVM, MPH, MS
Assistant Professor, Infectious Disease and Global Health
Cummings School of Veterinary Medicine at Tufts University
e: Marieke.Rosenbaum@tufts.edu | p: (617) 605-9089

200 Westboro Road, North
Grafton, MA 01536
TEL: 508.887.4374 | FAX: 508.839.7911

Tufts University &Tufts Medical Center and the Human Nutrition Research Center on Aging
Institutional Animal Care and Use Committee (IACUC)
Telephone: 617-636-4109 **Email:** iacuc-office@tufts.edu
Website: http://viceprovost.tufts.edu/iacuc/

FOR IACUC OFFICE USE ONLY

PROTOCOL #:	G2017-42
AMENDMENT #	1
AMENDMENT APPROVAL DATE:	

ANIMAL USE PROTOCOL AMENDMENT

*Amendments to protocols require Institutional Animal Care and Use Committee (IACUC) review and approval **prior** to initiation. The IACUC reserves the right to determine whether proposed changes require more information, Full Committee Review, or submission of a new protocol. When submitting an amendment, the Principal Investigator is required to review all of the details of the original protocol to assure the IACUC that all un-amended details remain identical to the original protocol. Please note that certain changes to protocols may affect other aspects of the protocol. Those changes also need to be reflected in this amendment.*

I. GENERAL INFORMATION

PRINCIPAL INVESTIGATOR:	Marieke Rosenbaum	DEGREE(S):	DVM, MPH, MS
ACADEMIC POSITION/TITLE:	Research Assistant Professor		
DEPARTMENT:	Infectious Disease and Global Health, TCSVM		
E-MAIL ADDRESS:	Marieke.rosenbaum@tufts.edu		
MAILING ADDRESS:	200 Westboro Road, North Grafton, MA 01536		
DIRECT PHONE #:	(617) 605-9089	EMERGENCY PHONE #	
LABORATORY MANAGER or PRIMARY CONTACT:	Marieke Rosenbaum	DEGREE(S):	
E-MAIL ADDRESS:			
DIRECT PHONE #:		EMERGENCY PHONE #	
PROTOCOL TITLE:	**Infectious Diseases in Neotropical Primates in Peru**		

PROPOSED MODIFICATIONS

For applicable checkboxes, double-click on the box and then select "checked" to mark, and then complete the relevant sections of the amendment form to describe changes or additions to your original protocol. Not all sections in the amendment form may be relevant for each type modification.

- ☒ Additional animals needed OR change in category
- ☐ New species to be used
- ☒ New procedure OR change in procedure
- ☒ Change in location
- ☐ None of the above

II. VERIFICATION OF REGULATORY APPROVALS

Please check all that correspond to this IACUC protocol. Double-click on a box and then select "checked" to mark your selection. Note that the Principal Investigator is responsible for ensuring that the appropriate permits and approvals remain up-to-date.

☐	**Institutional Biosafety Committee (IBC)** Registration Number(s):	☐	**Approval from TU Radiation Safety or TMC Health Physics** Hazard Name(s):
☐	**Environmental Health and Safety Chemical Hazard** Indicate chemicals that require an EHS registration and Safety Plan. Chemical Hazard Name(s): Applicable DLAM/LAMS Safety Plan(s):	☒	**Wildlife Permit(s)** Permit(s) issued for: Collection of samples from Primates issued by the Peruvian Government
☐	**Clinical Studies Review Committee (CSRC) Review**		

III. JUSTIFICATION FOR ADDITIONAL ANIMALS

Provide justification for additional animals. Describe why additional animals are requested and explain how their use relates to the Objectives, Goals, and Hypothesis (es) described in the main protocol.

We would like to expand the sample size to continue to conduct infectious disease surveillance for Herpesvirus, Zika virus, and Influenza virus, as well as begin to employ whole genome sequencing to recover and describe bacterial, fungal, parasitic, and viral species present in Neotropical primate samples. In addition, we will employ molecular epidemiology to better understand Herpesvirus transmission between hetero- and conspecific primate species. Thus, we would like to be able sample the same primates who are housed for long periods of time at sanctuaries up to 3 times per calendar year. We request to increase our total sample size to 400 and request to add flexibility to be able to collect samples at all the primate rescue centers located in Peru (~11).

IV. CHANGE IN SPECIES

A. Type of species requested IF NEW *(Boxes can be duplicated for additional species)*

Species name		Species name	
Species name		Species name	

B. Justify the choice of new species. Explain why the particular animal model was selected. Describe the unique characteristics each species has that are necessary for your investigations. **The description needs to be understandable to a lay person.**

No additional species

C. Genetically modified animals. Answer question 1 if any disease-causing phenotype is possible because of the genetic mutant. Answer questions 2-3 if IBC Notification is required for use/breeding of the strains. Please see IBC Policy on Genetically Engineered Mutants to determine if this is necessary.

1. **Describe the expected clinically-relevant phenotype(s). Clarify any potential detrimental effects to the animals' health.** *If unknown, please provide an educated guess based on the known function of the gene(s).*

2. **Confirm here** ☐ that neither parental transgenic rodent contains the following genetic modifications: (i) incorporation of more than one-half of the genome of an exogenous eukaryotic virus from a single family of viruses; or (ii) incorporation of a transgene that is under the control of a gammaretroviral long terminal repeat (LTR); and the transgenic rodent that results from this breeding is not expected to contain more than one-half of an exogenous viral genome from a single family of viruses.

3. **List the gene(s) (or family) that will be introduced into the germ line** and provide a brief description of its encoded gene products and known function. For each strain, provide the: a) transgene source; b) vector

used; and c) if a toxin or other hazardous agent is encoded (if not, state "no" as confirmation).

V. REGULATORY EXCEPTIONS

Per regulations, the items listed below must be approved by the IACUC. Please mark the correct box and provide the requested justification in the text box.

1. Are **multiple major survival surgeries** performed on the same animal? According to the Guide, major survival surgery "penetrates and exposes a body cavity, produces substantial impairment of physical or physiologic functions, or involves extensive tissue dissection or transection."
Please note that some surgical procedures characterized as minor may induce substantial post-procedural pain or impairment and should be similarly justified if performed more than once in a single animal below.

☒ No
☐ Yes. Provide scientific justification for the use of multiple survival surgeries and include the timeframe between the surgeries below:

2. Are unanesthetized animals **restrained** for **more than 30 minutes**? See *IACUC Policy for Physical Restraint of Research Animals*.

☒ No
☐ Yes. Provide scientific justification below:

3. Are **non-pharmaceutical grade (NPG) substances** used in live animals?
Check these references for availability of animal pharmaceuticals and human pharmaceuticals.

☒ No.
☐ Yes. If NPG grade substances must be used, please identify the justification(s) below:

- ☐ No pharmaceutical grade veterinary or human drug is available or consistently available.
- ☐ Although a pharmaceutical grade drug is available, the NPG drug is required to replicate methods from previous studies.
- ☐ Although a pharmaceutical grade drug is available, a greater concentration, different formulation, or route of administration is required.
- ☐ The available pharmaceutical grade formulation contains preservatives or inactive ingredients which confound the research goals of the study.
- ☐ Other (provide justification below).

Note: NPG substances will be the highest-grade available and formulated aseptically using sterile and biocompatible solutions appropriate for the route of administration. In addition, NPG substances administered parenterally (IV, IP, IM, SC) will be sterilized according to the *IACUC Policy on the Use of Expired Medical Materials and Pharmaceutical-Grade Compounds,* or else justified below.

4. Will **water or food be restricted** during any portion of the project? See *IACUC Policy on Food/Fluid Restriction or Deprivation* for specific protocol requirements.

☒ No
☐ Yes. Provide scientific justification below and the time limits for the restriction or deprivation (see Policy for these definitions).

5. Do you require an experimental exception for **single housing** of social species? See *IACUC Policy on Single*

Housing of Research Animals.

☒ No

☐ Yes. Provide scientific justification below:

6. Do you require an exception from standard **husbandry practices** or **environmental conditions** recommended in the Guide or Animal Welfare Regulations (e.g. prolonged cage or bedding change intervals, cage size, alteration of temperature, humidity, light level/cycle, use of wire bottom caging, removal of bedding substrate, exclusion from environmental enrichment, etc.)?

☒ No

☐ Yes. Describe and justify below:

7. Describe and justify any other exceptions to the Guide, Animal Welfare Regulations, or IACUC Policies not addressed above.

N/A

VI. NON STANDARD HOUSING AND CARE

Describe any specialized care and housing practices that do not constitute Regulatory Exceptions as described above.

1. Describe any **alterations of standard caging** or **specialized husbandry practices** that are not regulatory exemptions (e.g. use of metabolic caging, pinnacle caging, nonstandard enrichment conditions, etc.).

N/A

2. **Non-standard drinking water**: For ANY additives placed in the drinking water, provide the following information: 1) Name of additive, 2) Concentration/Dose/Volume, and 3) Frequency or Duration that treated water will be given.

N/A

3. **Non-standard diet/chow**: For ANY specialized diets used in place of the standard chow, provide the following information: 1) Name of diet; 2) Dietary composition, including name and concentration of any drugs formulated into the diet, and 3) Frequency or Duration.

☐ Confirm that specialized diet is nutritionally balanced. If it is not, provide scientific justification below:

N/A

4. **Therapeutic restrictions**: In an emergency, animals will be treated or euthanized by DLAM, LAMS, or CBU to relieve suffering if deemed necessary. Investigators will be contacted prior to diagnostic testing, therapy, or euthanasia whenever possible. In the event that contact is not possible, please respond below:

☒	No therapeutic restrictions exist.
☐	Confirm that if therapeutic restrictions exist, the research staff will notify DLAM, LAMS, or CBU in advance regarding treatment limitations.

NOTE: If emergency euthanasia is necessary, specimens will be saved only if prior arrangements have been made with the DLAM, LAMS, or CBU staff.

VII. CHANGE IN PROCEDURE

1. LIST PROCEDURE(S) TO BE ADDED OR CHANGED.

1. Addition: Sedation and sample collection from the sample animal up to 3x per year, each at least 2 months apart, increase sample size to 400.

2. Addition: Sedation and sample collection from primates and any of the ~11 primate rescue centers located throughout Peru
3. Addition: Non-invasively collect stool samples from captive and wild primates. Fresh fecal samples will be collected from the ground from captive and wild groups. In addition, when captive primates are sedated, fecal material will be manually extracted from the colon using a gloved finger or a fecal loop with lubrication, and/or a rectal swab.
4. Addition: Non-invasive saliva collection from free-roaming primates using discarded food or using a nylon rope collection method. Free-roaming primate groups will be habituated to a nylon rope coated in plantain or jam. The rope will be hung or placed daily in a central area where the group spends time to allow the group to interact with the rope and become accustomed to its presence. After 1-7 days of habituation, the rope will be collected and saliva will be eluted. In addition, discarded food (ie plants, fruit) will be collected and swabbed or eluted to attempt to recover saliva that can be used for infectious disease surveillance of wild primate populations. Our current IACUC covers this procedure in captive primates, and we request approval to also use this technique in free-roaming populations.
5. Addition: Include targeted detection of Influenza virus from samples, as well as metagenomic approach to detect diversity of microbial community in primates. This will not affect sample collection and animal handling, but expands the range of what we will test the samples for.

2. DESCRIBE AND JUSTIFY EACH NEW PROCEDURE/EXPERIMENT. Please note that many details of the in vivo procedures are specifically requested in other sections. Avoid unnecessary duplication.

1. Our preliminary results indicate that Herpesvirus is circulating in the primate population. The consensus Herpesvirus PCR amplified a region of the dPol gene in 42.4% of the samples, and of the Terminase gene in 4.8% of the samples, detecting Human alphaherpesvirus 1, Saimirine gammaherpesvirus 2 and Ateline alphaherpesvirus 1. Herpesviral DNA was detected in 38.9% of blood samples and 74.4% of saliva samples using both molecular markers. We are beginning a study of the molecular epidemiology of herpesvirus in captive primates to understand transmission dynamics in this context. Thus, repeat sampling from the same primate over time is needed to determine the different strains of the virus that are present and to determine how they are circulating in a semi-closed population.
2. Our preliminary results indicate that herpesvirus is present in the sample population. We would like to expand to provide a more broadly representative description of infectious diseases of public health and conservation medicine relevance in Neotropical primate populations throughout the country. Since this is a surveillance-based project, our current results are skewed and are not representative of the primate trafficking industry in Peru.
3. One main focus of our research is to develop non-invasive means to conduct infectious disease surveillance in primates. Stool/rectal swab samples are easy to collect both non-invasively and in a sedated animal. Expanding to include this sample will improve our ability to optimize non-invasive sampling.
4. Thus far we have only attempted non-invasive saliva collection from captive primates. This technique is being applied to free roaming Old World primate populations in Africa and Asia, however it has not been tested in Neotropical primates such as those found in Peru. If successful, it will greatly increase our ability to conduct infectious disease surveillance in free-roaming South American primates.
5. Influenzas and other infectious diseases are of public health relevance and the role that Neotrpoical primates play in the ecology of most pathogens to which they are susceptible is unknown.

3. JUSTIFICATION FOR CATEGORY E PROCEDURES. Please provide **scientific justification** for why pain and/or significant distress is an unavoidable part of the research/procedures and why it cannot be alleviated.

N/A

VIII. PROCEDURAL DETAILS

A. EXPERIMENTAL ADMINISTRATIONS

Recommended Needle Sizes (Gauge)

Species	SQ	IP	IV	IM	Oral Gavage
Mouse	23-30 G	25-27 G	26-28 G	27 G	18-24 G
Rat	20-27 G	23-27 G	21-23 G	25 G	13-20 G
Hamster	25 G	23-25 G	25-27 G	25 G	
Guinea Pig	23-25 G	23-25 G	25-27 G	25 G	
Bird	21-25 G	N/A	25-27 G	25-27 G	

Please copy the table below if more than one substance is being administered. Do not include water or diet provisions already addressed in Section VI.

1) Name of substance	
2) Volume	
3) Dosage, if appropriate	
4) Route	☐ SQ ☐ IP ☐ IV ☐ IM ☐ PO ☐ Other route: _____

If requesting larger needle sizes than recommended above, provide justification:

B. IMPLANTS

1) Type and material of implant	
2) Site(s) of implantation	
3) Size of implant	
4) Method of sterilization for implant	
5) Length of time of implantation	
6) Removal procedure (N/A, if post-mortem)	
7) For drugs, compounds, or other substances administered via pump or pellet, provide dosage (in mg/kg/day) and confirm how sterility of the substance will be ensured prior to loading.	

C. SURVIVAL BLOOD COLLECTION

Acceptable Rodent Blood Sample Volumes

Body weight (g)	Circulating Blood Volume (CBV) (ml)	10% CBV (ml) every 2 wks†
20	1.10 – 1.40	.11 – .14
25	1.37 – 1.75	.14 – .18
30	1.65 – 2.10	.17 – .21
35	1.93 – 2.45	.19 – .25
40	2.20 – 2.80	.22 – .28
125	6.88 – 8.75	.69 – .88
150	8.25 – 10.50	.82 – 1.0
200	11.00 – 14.00	1.1 – 1.4

250	13.75 – 17.50	1.4 – 1.8
300	16.50 – 21.00	1.7 – 2.1
350	19.25 – 24.50	1.9 – 2.5

† max cumulative sample volume for that sampling frequency

If more than one experiment includes survival blood collections, please copy the table below as needed.

Specify Experiment(s):	Blood collection for infectious disease testing
1) Blood draw method and anatomical area used	Femoral vein
2) Maximum amount for each blood draw	1-5ml (not more than 1% of the total body weight of the animal)
3) Frequency of draws/animal	up to 3x per year, each at least 2 months apart
4) Maximum number of draws/animal	3x/year
If requesting larger volumes than recommended, provide scientific justification below:	

D. BEHAVIORAL TESTS

Name of behavioral test	Time required for each testing and/or training session	Frequency of testing/training sessions and interval between sessions	Duration of testing/training sessions
For example: Morris water maze	*1 minute*	*2-4 trials/day, 6 hrs apart*	*4 days*

METHODS USED		
1) Please describe the goals and performance expected for each test.		
2) Will an apparatus be used?	☐ No ☐ Yes	If yes, please describe below.
3) Will aversive stimuli be used?	☐ No ☐ Yes	If yes, describe the stimulus and its intensity, duration and frequency of administration below.
4) Please describe limits to deprivation or aversive stimuli if desired response does not occur.		
5) Will rewards be used?	☐ No ☐ Yes	If yes, please describe below.
6) Please describe other techniques to be used below, if applicable.		

E. EXPERIMENTAL TUMOR GROWTH

1) Indicate if spontaneous neoplasia or induced tumor? (*If spontaneous growth, then skip to #5)*		
2) Identity and source of the tumor		
3) Is the tumor of **rodent origin** or been passaged **in rodents**?	☐ Yes	☐ No

If **yes**, they must be tested for contamination with adventitious agents unless it has been produced in SPF animals in a Tufts barrier. For more info contact DLAM/CBU/LAMS.	
4) Is the tumor of **human origin**?	☐ Yes ☐ No
If **yes,** IBC approval must be obtained **prior to use.** Human source materials require IBC approval.	
5) Provide primary site(s) of anticipated tumor growth and any expected sites of metastasis, if applicable.	
6) Provide method of measuring tumor growth	
7) Provide maximum size and dimension of tumor	

F. USE OF ANTIBODY PREPARATIONS OR OTHER BIOLOGICS

1) Are antibody preparations used? If yes, continue by checking the appropriate box(es) below:	☐ Yes* ☒ No
☐ Antibodies will be obtained commercially (off the shelf) *OR* ☐ Antibodies will be custom made. If custom made, continue below: ☐ in vitro tissue culture techniques used *OR* ☐ in vivo techniques used. If live animals are used, continue below: ☐ in-house production (describe in Section VII) *OR* ☐ vendor produced (see Custom Antibody policy for list of approved vendors)	
2) Are other biologics (e.g. blood, serum, cellular components) used?	☐ Yes* ☒ No
*If **yes,** they must be tested for contamination with adventitious agents unless it has been produced in SPF animals in a Tufts barrier. For more information, please contact: DLAM - Boston Campus: 617-636-6488 CBU – 617-556-3201 LAMS - Grafton Campus: 508-887-4511	

G. DETAILS OF ANESTHESIA if NOT used for surgery or euthanasia. Include drug name(s), dose (mg/kg), frequency, and route.

☐ Confirm USP grade anesthetics will be used	
Name of procedure(s):	No change from the original protocol.
Pre-anesthesia	
Anesthesia	
Maintenance anesthesia	
Methods used to monitor anesthetic depth	
☐ All animals are monitored continuously while under anesthesia. ☐ Supplemental heat is provided while the animal is under anesthesia. See DLAM website for list of DLAM/LAMS Approved Thermoregulatory Devices for Rodents.	

IX. SURGERY DESCRIPTION

If more than one surgery is being added, please copy the table below and answer questions 1-6 for each individual surgery. See *IACUC Policy for Conducting Survival Surgical Procedures in Rodents*. Please note that there are additional requirements for non-rodent species. Exsanguinations that require a skin incision to expose the vessel and perfusions need to be described as terminal surgeries.

1) Name of surgery:	Confirm if ☐ survival or ☐ terminal
2) Check the relevant boxes for this surgery:	
All of the following are required for survival surgery. Please provide scientific justification to omit or change. Terminal surgeries only require continuous monitoring under anesthesia (the last box). ☐ Disinfection of the surgical area/table.	

☐ Surgeon is properly prepared for each surgery. This includes, at a minimum, sterile gloves, mask, and disposable (or clean) lab coat.
☐ Animal is appropriately prepped for surgery by the following steps:
1. Provision of eye lubricant
2. Removal of the fur/hair
3. Disinfectant/ethanol wipe of the skin (3x for each scrub).
☐ Supplemental heat is provided while the animal is under anesthesia. See DLAM website for list of DLAM/LAMS Approved Thermoregulatory Devices for Rodents.
☐ All animals are monitored continuously while under anesthesia.

3) Anesthetic details [include drug name(s), dose (mg/kg), frequency, route] ☐ Confirm USP grade	
Pre-anesthesia	
Anesthesia	
Anesthetic maintenance	
Methods used to monitor anesthetic depth	
Methods used for intraoperative monitoring (USDA species only)	

4) How are the surgical instruments sterilized for survival surgery?

5) Describe the surgery in detail including skin incision, all manipulations, closure, and suture information.
There is no need to repeat details confirmed in Part 2 and 3 above.

☐ Confirm initial dose of analgesia will be given prior to making the incision OR justify if this cannot be done.

☐ Confirm sutures and/or wound clips will be removed 7-14 days postoperatively.

6) Analgesic regimen: *Provide initial dose prior to making the incision. If post-op analgesics cannot be used at all, justify in Section XIII Part 4: Justification for Cat E Procedures.* ☐ Confirm USP grade analgesics will be used.

A. Analgesic used	
B. Dose and route of administration	
C. Frequency and length of time provided	

X. ANIMAL CARE AND MONITORING

A. What adverse effects may occur as a result of the experiments and/or from surgery? Describe expected experimental effects, distress, pain, significant discomfort, morbidity, etc. For surgery, include what methods will be used to avoid tissue infection, inflammation, erosion, or accidental removal of any implants, and how they will be alleviated if present? If adverse effects occur, how will they be alleviated (e.g. with analgesia, nursing care, nutritional support or euthanasia)?

No change from the original protocol.

B. Humane endpoint criteria (e.g. tumor size and/or necrosis, % body weight gain/loss, body condition, inability to eat or drink, behavioral abnormalities, clinical symptoms, signs of toxicity, etc.) must be specified when the experimental manipulations could cause significant adverse effects or are potentially lethal. Clearly list the criteria used to determine when euthanasia will be performed even if prior to the experimental endpoint.

No change from the original protocol.

C. Describe the frequency and the length of the time that ALL animals will be observed in order to evaluate pain/distress during the lifespan of the protocol. Include post-operative care and monitoring required at least daily for 72 hours after surgery (where the day of surgery is considered Day 0). This monitoring must be documented on the surgery card (for rodents) or in the medical records (for large animals). Also, when applicable, include information about the general observation of animals during time periods when they are not involved in experiments.		
Procedure or Experiment name(s)	**Frequency of observations/monitoring** Include frequency of weighing if applicable. How will nursing care be provided and how will monitoring change if health changes?	**Criteria used to assess declining health** (e.g. weight loss, dyspnea, ruffled fur)
No change from the original protocol.		

XI. LOCATION OF ANIMALS

1. Are live animals ever used outside of the centralized facilities?	☐ Yes ☐ No ☒ Other location
NOTE: *Animals can only be outside of the centralized facility for less than 24 hours (or less than 12 hours for USDA species), unless the area is an IACUC approved satellite facility.*	

If you answered **yes** above, please complete question 1. If you answered **other location**, please complete question 2.

1A. Name of procedure or indicate if satellite housing (e.g. name of surgery, sacrifice/ tissue harvest, imaging, monitoring, etc.)	**Building and Room Number**	**Has the room already been approved by the IACUC?**	**Longest Period of Time Animals Would Be Present**
☐ sacrifice/tissue harvest		☐ yes ☐ no	
☐ survival surgery		☐ yes ☐ no	
☐ non-survival surgery		☐ yes ☐ no	
☐ satellite housing		☐ yes ☐ no	
☐ other: _____		☐ yes ☐ no	

1B. Provide justification below for removing animals from central facilities.

2. Provide description(s) and justification for field studies and use of other locations.
We are currently approved to work with primates at the Taricaya Rescue Center in Peru. We would like to expand to begin to collect samples at the ~11 primate rescue centers that are located throughout Peru.

XII. DISPOSITION OF ANIMALS FOLLOWING STUDY

Provide details of euthanasia for each species. **Even if the experimental plan does not include euthanasia, protocols must include an emergency plan in case euthanasia becomes necessary.** No animal may be adopted, reused, or given away without advance permission from DLAM, LAMS, or CBU.

- Copy and paste the chart below for each different species, if necessary.
- If an inhalant is selected as the euthanizing agent, a secondary method of euthanasia is required. See IACUC Policy on the Use of Inhalants for Euthanasia.

- Methods of euthanasia must be consistent with the AVMA Guidelines or otherwise scientific justification must be provided below.

☒ **No change in euthanasia method(s) from current protocol.**

☐ **A NEW euthanasia method is requested below.**

Species name	
Primary euthanasia method	
Confirm secondary euthanasia method when inhalant is used	☐ Cervical dislocation, decapitation, thoracotomy, exsanguination, or major organ removal will be performed following the primary method
Other euthanasia methods:	

☐ **A physical method of sacrifice will be used without prior anesthesia or sedation** (i.e. conscious cervical dislocation or decapitation). Please provide justification below. See *IACUC Policy on Conditionally Accepted Euthanasia Methods for Rodents* and *IACUC Policy for Maintenance of Blades for Use in Conscious Decapitation*.

☐ **Euthanasia is not expected or required. Emergency only.**

XIII. JUSTIFICATION FOR NUMBER OF ANIMALS

1. EXPLANATION FOR THE NUMBER OF ANIMALS REQUESTED. Explain how the number of animals requested was determined. Include justification for the group sizes, the number of groups per experiment, the number of repetitions, etc. The number of animals should be the minimum number required to obtain statistically valid results. Please include a description of the statistical analyses, including tests, power and probability levels utilized, if applicable. Include which animals belong in which pain/distress category (C, D, or E). You are encouraged to include a table or flowchart.

Sample size of 400 is based on determining the frequency of disease in a large population when the frequency of the disease is unknown. For a confidence level of 95%, and using an absolute precision of 5%, we will need 384 individual animals. This was calculated using Open Epi sample size calculator for determining proportions in a population.

2. TOTAL NUMBER OF ANIMALS USED FOR BREEDING. Provide the total number of animals bred under this protocol. Please provide a clear distinction between which of the animals bred will be used in the experiments above and which are used for maintenance or culled only.

Mouse		Rat		Other	

If bred in-house, provide a table/chart below that organizes the number expected from breeding.

Be sure to include all parents and offspring even if not directly used in experimental procedures. Estimate litters per female, litter size, and how many animals born that may be culled based on Mendelian genetics or other methods. The IACUC suggests estimating high using 10 pups per pregnancy, if unknown. Please use this guideline or give justification for a different estimate. All animals born have to be accounted for in the protocol, even if not used in the experiments.

3. TOTAL NUMBER OF ANIMALS. Please provide the total number of animals required listed by species. For each species, identify the number of animals that will be utilized in each USDA pain/distress category. Be sure these category subtotals are equal to the total number requested. ALL animals, regardless of whether they are used in experiments, MUST be accounted for in the protocol. **Remember to include all animals used for breeding/maintenance.**

USDA Category C – Procedures with minimal, momentary, or no distress.
USDA Category D – Use of appropriate anesthetics, tranquilizers, or analgesics to alleviate pain and/or distress.
USDA Category E – Animals may experience unrelieved pain and/or distress without intervention.

Species name	Peruvian Neotropical Primates		
Category C			
Category D	400		
Category E			
Total number requested	400		

XIV. SEARCH FOR ALTERNATIVES

Federal regulations mandate that you describe how the lack of alternative methods was verified for each potentially painful/distressing procedure or disease **(ONLY for Category D and/or E procedures).** Category C procedures do not need an alternative search.

A. GENERAL SEARCH INFORMATION	
The database(s) searched	No change from the original protocol.
The date that the search was conducted	
The years covered by the search	

B. DESCRIBE YOUR SEARCH STRATEGY BELOW

Recommended Search Strategy ➔ "*procedure*" and "*species*" and "*alternative(s)*" = # references

The Committee must be able to understand the keywords and search strategy used. The number of references for each keyword combination must also be provided.

Example: Use of anesthesia in mice = *[anesthesia + (mouse or mice) + (alternative or alternatives)] = # of references retrieved.*

C. PROVIDE A NARRATIVE FOR EACH SEARCH. The Committee must be readily able to assess whether the search topics were appropriate and whether the search was sufficiently thorough.

XV. PRINCIPAL INVESTIGATOR ASSURANCE OF COMPLIANCE

As the individual responsible for this project, I confirm that:

☒ *The information contained in this protocol is true and accurate, and that, to the best of my knowledge, it conforms to Tufts University/Tufts Medical Center IACUC, NIH, USDA, and MDPH policies on the use of animals in research and teaching.*
☒ *I have considered alternatives to the biological models used in this project, and have found these other methods unacceptable on scientific or educational grounds.*
☒ *I certify that I have determined that the research proposed herein is not unnecessarily duplicative of previously*

reported research.

☒ *I accept responsibility for ensuring that all personnel involved in this project will be trained regarding any potential chemical hazards, relevant safety practices and emergency procedures. I confirm that the relevant DLAM/LAMS/CBU Safety Plan(s) will be followed.*

☒ *I accept responsibility for ensuring that all personnel involved in this project will be trained regarding any potential biological hazards, relevant safety practices, and emergency procedures. If applicable, I confirm that all relevant Institutional Biosafety Committee requirements will be followed.*

☒ *All personnel named above have agreed to participate in this study and are aware of procedures that are approved. All individuals who will be involved with the animals used in the project have been instructed in the humane care, handling, and use of animals, and I have reviewed their qualifications.*

☒ *No change will be made to procedures, care, or housing without prior written notification to and approval by the Institutional Animal Care and Use Committee (IACUC).*

☒ *I understand that it is non-compliant to release an IACUC approval date without documentation of a congruency comparison conducted by the IACUC Office. For more information, please see the Policy on Requiring a Congruency Comparison Prior to Release of IACUC Approval Dates.*

☒ *I understand that failure to comply with IACUC policies and procedures will jeopardize Tufts University, Tufts University-Tufts Medical Center, or the Human Nutrition Research Center on Aging at Tufts University's Animal Welfare Assurances on file with the NIH, and may lead to revocation of my privileges to conduct animal research at this institution.*

Marieke Rosenbaum	4/20/18
Principal Investigator (*provide electronic signature*)	Date

By typing your name you are submitting an electronic signature that confirms your understanding and adherence to the above statements and IACUC policies. This is considered legal documentation and confirmation of your agreement to execute all activities as approved.

Tufts University &Tufts Medical Center and the Human Nutrition Research Center on Aging
Institutional Animal Care and Use Committee (IACUC)
Telephone: 617-636-4109 **Email:** iacuc-office@tufts.edu
Website: http://viceprovost.tufts.edu/iacuc/

FOR IACUC OFFICE USE ONLY

PROTOCOL #:	G2017-42
AMENDMENT #	1
AMENDMENT APPROVAL DATE:	

ANIMAL USE PROTOCOL AMENDMENT

*Amendments to protocols require Institutional Animal Care and Use Committee (IACUC) review and approval **prior** to initiation. The IACUC reserves the right to determine whether proposed changes require more information, Full Committee Review, or submission of a new protocol. When submitting an amendment, the Principal Investigator is required to review all of the details of the original protocol to assure the IACUC that all un-amended details remain identical to the original protocol. Please note that certain changes to protocols may affect other aspects of the protocol. Those changes also need to be reflected in this amendment.*

I. GENERAL INFORMATION

PRINCIPAL INVESTIGATOR:	Marieke Rosenbaum	DEGREE(S):	DVM, MPH, MS
ACADEMIC POSITION/TITLE:	Research Assistant Professor		
DEPARTMENT:	Infectious Disease and Global Health, TCSVM		
E-MAIL ADDRESS:	Marieke.rosenbaum@tufts.edu		
MAILING ADDRESS:	200 Westboro Road, North Grafton, MA 01536		
DIRECT PHONE #:	(617) 605-9089	EMERGENCY PHONE #	
LABORATORY MANAGER or PRIMARY CONTACT:	Marieke Rosenbaum	DEGREE(S):	
E-MAIL ADDRESS:			
DIRECT PHONE #:		EMERGENCY PHONE #	
PROTOCOL TITLE:	**Infectious Diseases in Neotropical Primates in Peru**		

PROPOSED MODIFICATIONS

For applicable checkboxes, double-click on the box and then select "checked" to mark, and then complete the relevant sections of the amendment form to describe changes or additions to your original protocol. Not all sections in the amendment form may be relevant for each type modification.

- ☒ Additional animals needed OR change in category
- ☐ New species to be used
- ☒ New procedure OR change in procedure
- ☒ Change in location
- ☐ None of the above

II. VERIFICATION OF REGULATORY APPROVALS

Please check all that correspond to this IACUC protocol. Double-click on a box and then select "checked" to mark your selection. Note that the Principal Investigator is responsible for ensuring that the appropriate permits and approvals remain up-to-date.

☐	**Institutional Biosafety Committee (IBC)** Registration Number(s):	☐	**Approval from TU Radiation Safety or TMC Health Physics** Hazard Name(s):
☐	**Environmental Health and Safety Chemical Hazard** Indicate chemicals that require an EHS registration and Safety Plan. Chemical Hazard Name(s): Applicable DLAM/LAMS Safety Plan(s):	☒	**Wildlife Permit(s)** Permit(s) issued for: Collection of samples from Primates issued by the Peruvian Government
☐	**Clinical Studies Review Committee (CSRC) Review**		

III. JUSTIFICATION FOR ADDITIONAL ANIMALS

Provide justification for additional animals. Describe why additional animals are requested and explain how their use relates to the Objectives, Goals, and Hypothesis (es) described in the main protocol.

We would like to expand the sample size to continue to conduct infectious disease surveillance for Herpesvirus, Zika virus, and Influenza virus, as well as begin to employ whole genome sequencing to recover and describe bacterial, fungal, parasitic, and viral species present in Neotropical primate samples. In addition, we will employ molecular epidemiology to better understand Herpesvirus transmission between hetero- and conspecific primate species. Thus, we would like to be able sample the same primates who are housed for long periods of time at sanctuaries up to 3 times per calendar year. We request to increase our total sample size to 400 and request to add flexibility to be able to collect samples at all the primate rescue centers located in Peru (~11).

IV. CHANGE IN SPECIES

A. Type of species requested IF NEW *(Boxes can be duplicated for additional species)*

Species name		Species name	
Species name		Species name	

B. Justify the choice of new species. Explain why the particular animal model was selected. Describe the unique characteristics each species has that are necessary for your investigations. **The description needs to be understandable to a lay person.**

No additional species

C. Genetically modified animals. Answer question 1 if any disease-causing phenotype is possible because of the genetic mutant. Answer questions 2-3 if IBC Notification is required for use/breeding of the strains. Please see IBC Policy on Genetically Engineered Mutants to determine if this is necessary.

1. **Describe the expected clinically-relevant phenotype(s). Clarify any potential detrimental effects to the animals' health.** *If unknown, please provide an educated guess based on the known function of the gene(s).*

2. **Confirm here** ☐ that neither parental transgenic rodent contains the following genetic modifications: (i) incorporation of more than one-half of the genome of an exogenous eukaryotic virus from a single family of viruses; or (ii) incorporation of a transgene that is under the control of a gammaretroviral long terminal repeat (LTR); and the transgenic rodent that results from this breeding is not expected to contain more than one-half of an exogenous viral genome from a single family of viruses.

3. **List the gene(s) (or family) that will be introduced into the germ line** and provide a brief description of its encoded gene products and known function. For each strain, provide the: a) transgene source; b) vector

used; and c) if a toxin or other hazardous agent is encoded (if not, state "no" as confirmation).

V. REGULATORY EXCEPTIONS

Per regulations, the items listed below must be approved by the IACUC. Please mark the correct box and provide the requested justification in the text box.

1. Are **multiple major survival surgeries** performed on the same animal? According to the Guide, major survival surgery "penetrates and exposes a body cavity, produces substantial impairment of physical or physiologic functions, or involves extensive tissue dissection or transection."
Please note that some surgical procedures characterized as minor may induce substantial post-procedural pain or impairment and should be similarly justified if performed more than once in a single animal below.

☒ No
☐ Yes. Provide scientific justification for the use of multiple survival surgeries and include the timeframe between the surgeries below:

2. Are unanesthetized animals **restrained** for **more than 30 minutes**? See *IACUC Policy for Physical Restraint of Research Animals*.

☒ No
☐ Yes. Provide scientific justification below:

3. Are **non-pharmaceutical grade (NPG) substances** used in live animals?
Check these references for availability of animal pharmaceuticals and human pharmaceuticals.

☒ No.
☐ Yes. If NPG grade substances must be used, please identify the justification(s) below:

- ☐ No pharmaceutical grade veterinary or human drug is available or consistently available.
- ☐ Although a pharmaceutical grade drug is available, the NPG drug is required to replicate methods from previous studies.
- ☐ Although a pharmaceutical grade drug is available, a greater concentration, different formulation, or route of administration is required.
- ☐ The available pharmaceutical grade formulation contains preservatives or inactive ingredients which confound the research goals of the study.
- ☐ Other (provide justification below).

Note: NPG substances will be the highest-grade available and formulated aseptically using sterile and biocompatible solutions appropriate for the route of administration. In addition, NPG substances administered parenterally (IV, IP, IM, SC) will be sterilized according to the *IACUC Policy on the Use of Expired Medical Materials and Pharmaceutical-Grade Compounds,* or else justified below.

4. Will **water or food be restricted** during any portion of the project? See *IACUC Policy on Food/Fluid Restriction or Deprivation* for specific protocol requirements.

☒ No
☐ Yes. Provide scientific justification below and the time limits for the restriction or deprivation (see Policy for these definitions).

5. Do you require an experimental exception for **single housing** of social species? See *IACUC Policy on Single*

Housing of Research Animals.

☒ No

☐ Yes. Provide scientific justification below:

6. Do you require an exception from standard **husbandry practices** or **environmental conditions** recommended in the Guide or Animal Welfare Regulations (e.g. prolonged cage or bedding change intervals, cage size, alteration of temperature, humidity, light level/cycle, use of wire bottom caging, removal of bedding substrate, exclusion from environmental enrichment, etc.)?

☒ No

☐ Yes. Describe and justify below:

7. Describe and justify any other exceptions to the Guide, Animal Welfare Regulations, or IACUC Policies not addressed above.

N/A

VI. NON STANDARD HOUSING AND CARE

Describe any specialized care and housing practices that do not constitute Regulatory Exceptions as described above.

1. Describe any **alterations of standard caging** or **specialized husbandry practices** that are not regulatory exemptions (e.g. use of metabolic caging, pinnacle caging, nonstandard enrichment conditions, etc.).

N/A

2. **Non-standard drinking water**: For ANY additives placed in the drinking water, provide the following information: 1) Name of additive, 2) Concentration/Dose/Volume, and 3) Frequency or Duration that treated water will be given.

N/A

3. **Non-standard diet/chow**: For ANY specialized diets used in place of the standard chow, provide the following information: 1) Name of diet; 2) Dietary composition, including name and concentration of any drugs formulated into the diet, and 3) Frequency or Duration.

☐ Confirm that specialized diet is nutritionally balanced. If it is not, provide scientific justification below:

N/A

4. **Therapeutic restrictions**: In an emergency, animals will be treated or euthanized by DLAM, LAMS, or CBU to relieve suffering if deemed necessary. Investigators will be contacted prior to diagnostic testing, therapy, or euthanasia whenever possible. In the event that contact is not possible, please respond below:

☒	No therapeutic restrictions exist.
☐	Confirm that if therapeutic restrictions exist, the research staff will notify DLAM, LAMS, or CBU in advance regarding treatment limitations.

NOTE: If emergency euthanasia is necessary, specimens will be saved only if prior arrangements have been made with the DLAM, LAMS, or CBU staff.

VII. CHANGE IN PROCEDURE

1. LIST PROCEDURE(S) TO BE ADDED OR CHANGED.

1. Addition: Sedation and sample collection from the sample animal up to 3x per year, each at least 2 months apart, increase sample size to 400.

2. Addition: Sedation and sample collection from primates and any of the ~11 primate rescue centers located throughout Peru
3. Addition: Non-invasively collect stool samples from captive and wild primates. Fresh fecal samples will be collected from the ground from captive and wild groups. In addition, when captive primates are sedated, fecal material will be manually extracted from the colon using a gloved finger or a fecal loop with lubrication, and/or a rectal swab.
4. Addition: Non-invasive saliva collection from free-roaming primates using discarded food or using a nylon rope collection method. Free-roaming primate groups will be habituated to a nylon rope coated in plantain or jam. The rope will be hung or placed daily in a central area where the group spends time to allow the group to interact with the rope and become accustomed to its presence. After 1-7 days of habituation, the rope will be collected and saliva will be eluted. In addition, discarded food (ie plants, fruit) will be collected and swabbed or eluted to attempt to recover saliva that can be used for infectious disease surveillance of wild primate populations. Our current IACUC covers this procedure in captive primates, and we request approval to also use this technique in free-roaming populations.
5. Addition: Include targeted detection of Influenza virus from samples, as well as metagenomic approach to detect diversity of microbial community in primates. This will not affect sample collection and animal handling, but expands the range of what we will test the samples for.

2. DESCRIBE AND JUSTIFY EACH NEW PROCEDURE/EXPERIMENT. Please note that many details of the in vivo procedures are specifically requested in other sections. Avoid unnecessary duplication.

1. Our preliminary results indicate that Herpesvirus is circulating in the primate population. The consensus Herpesvirus PCR amplified a region of the dPol gene in 42.4% of the samples, and of the Terminase gene in 4.8% of the samples, detecting Human alphaherpesvirus 1, Saimirine gammaherpesvirus 2 and Ateline alphaherpesvirus 1. Herpesviral DNA was detected in 38.9% of blood samples and 74.4% of saliva samples using both molecular markers. We are beginning a study of the molecular epidemiology of herpesvirus in captive primates to understand transmission dynamics in this context. Thus, repeat sampling from the same primate over time is needed to determine the different strains of the virus that are present and to determine how they are circulating in a semi-closed population.
2. Our preliminary results indicate that herpesvirus is present in the sample population. We would like to expand to provide a more broadly representative description of infectious diseases of public health and conservation medicine relevance in Neotropical primate populations throughout the country. Since this is a surveillance-based project, our current results are skewed and are not representative of the primate trafficking industry in Peru.
3. One main focus of our research is to develop non-invasive means to conduct infectious disease surveillance in primates. Stool/rectal swab samples are easy to collect both non-invasively and in a sedated animal. Expanding to include this sample will improve our ability to optimize non-invasive sampling.
4. Thus far we have only attempted non-invasive saliva collection from captive primates. This technique is being applied to free roaming Old World primate populations in Africa and Asia, however it has not been tested in Neotropical primates such as those found in Peru. If successful, it will greatly increase our ability to conduct infectious disease surveillance in free-roaming South American primates.
5. Influenzas and other infectious diseases are of public health relevance and the role that Neotrpoical primates play in the ecology of most pathogens to which they are susceptible is unknown.

3. JUSTIFICATION FOR CATEGORY E PROCEDURES. Please provide **scientific justification** for why pain and/or significant distress is an unavoidable part of the research/procedures and why it cannot be alleviated.

N/A

VIII. PROCEDURAL DETAILS

A. EXPERIMENTAL ADMINISTRATIONS

Recommended Needle Sizes (Gauge)

Species	SQ	IP	IV	IM	Oral Gavage
Mouse	23-30 G	25-27 G	26-28 G	27 G	18-24 G
Rat	20-27 G	23-27 G	21-23 G	25 G	13-20 G
Hamster	25 G	23-25 G	25-27 G	25 G	
Guinea Pig	23-25 G	23-25 G	25-27 G	25 G	
Bird	21-25 G	N/A	25-27 G	25-27 G	

Please copy the table below if more than one substance is being administered. Do not include water or diet provisions already addressed in Section VI.

1) Name of substance	
2) Volume	
3) Dosage, if appropriate	
4) Route	☐ SQ ☐ IP ☐ IV ☐ IM ☐ PO ☐ Other route: _____

If requesting larger needle sizes than recommended above, provide justification:

B. IMPLANTS

1) Type and material of implant	
2) Site(s) of implantation	
3) Size of implant	
4) Method of sterilization for implant	
5) Length of time of implantation	
6) Removal procedure (N/A, if post-mortem)	
7) For drugs, compounds, or other substances administered via pump or pellet, provide dosage (in mg/kg/day) and confirm how sterility of the substance will be ensured prior to loading.	

C. SURVIVAL BLOOD COLLECTION

Acceptable Rodent Blood Sample Volumes

Body weight (g)	Circulating Blood Volume (CBV) (ml)	10% CBV (ml) every 2 wks†
20	1.10 – 1.40	.11 – .14
25	1.37 – 1.75	.14 – .18
30	1.65 – 2.10	.17 – .21
35	1.93 – 2.45	.19 – .25
40	2.20 – 2.80	.22 – .28
125	6.88 – 8.75	.69 – .88
150	8.25 – 10.50	.82 – 1.0
200	11.00 – 14.00	1.1 – 1.4

250	13.75 – 17.50	1.4 – 1.8
300	16.50 – 21.00	1.7 – 2.1
350	19.25 – 24.50	1.9 – 2.5

† max cumulative sample volume for that sampling frequency

If more than one experiment includes survival blood collections, please copy the table below as needed.

Specify Experiment(s):	Blood collection for infectious disease testing
1) Blood draw method and anatomical area used	Femoral vein
2) Maximum amount for each blood draw	1-5ml (not more than 1% of the total body weight of the animal)
3) Frequency of draws/animal	up to 3x per year, each at least 2 months apart
4) Maximum number of draws/animal	3x/year
If requesting larger volumes than recommended, provide scientific justification below:	

D. BEHAVIORAL TESTS

Name of behavioral test	Time required for each testing and/or training session	Frequency of testing/training sessions and interval between sessions	Duration of testing/training sessions
For example: Morris water maze	*1 minute*	*2-4 trials/day, 6 hrs apart*	*4 days*

METHODS USED		
1) Please describe the goals and performance expected for each test.		
2) Will an apparatus be used?	☐ No ☐ Yes	If yes, please describe below.
3) Will aversive stimuli be used?	☐ No ☐ Yes	If yes, describe the stimulus and its intensity, duration and frequency of administration below.
4) Please describe limits to deprivation or aversive stimuli if desired response does not occur.		
5) Will rewards be used?	☐ No ☐ Yes	If yes, please describe below.
6) Please describe other techniques to be used below, if applicable.		

E. EXPERIMENTAL TUMOR GROWTH

1) Indicate if spontaneous neoplasia or induced tumor? (*If spontaneous growth, then skip to #5)*		
2) Identity and source of the tumor		
3) Is the tumor of **rodent origin** or been passaged **in rodents**?	☐ Yes	☐ No

If **yes**, they must be tested for contamination with adventitious agents unless it has been produced in SPF animals in a Tufts barrier. For more info contact DLAM/CBU/LAMS.	
4) Is the tumor of **human origin**?	☐ Yes ☐ No
If **yes,** IBC approval must be obtained **prior to use.** Human source materials require IBC approval.	
5) Provide primary site(s) of anticipated tumor growth and any expected sites of metastasis, if applicable.	
6) Provide method of measuring tumor growth	
7) Provide maximum size and dimension of tumor	

F. USE OF ANTIBODY PREPARATIONS OR OTHER BIOLOGICS

1) Are antibody preparations used? If yes, continue by checking the appropriate box(es) below:	☐ Yes* ☒ No
☐ Antibodies will be obtained commercially (off the shelf) *OR* ☐ Antibodies will be custom made. If custom made, continue below: ☐ in vitro tissue culture techniques used *OR* ☐ in vivo techniques used. If live animals are used, continue below: ☐ in-house production (describe in Section VII) *OR* ☐ vendor produced (see Custom Antibody policy for list of approved vendors)	
2) Are other biologics (e.g. blood, serum, cellular components) used?	☐ Yes* ☒ No
*If **yes,** they must be tested for contamination with adventitious agents unless it has been produced in SPF animals in a Tufts barrier. For more information, please contact: DLAM - Boston Campus: 617-636-6488 CBU – 617-556-3201 LAMS - Grafton Campus: 508-887-4511	

G. DETAILS OF ANESTHESIA if NOT used for surgery or euthanasia. Include drug name(s), dose (mg/kg), frequency, and route.

☐ Confirm USP grade anesthetics will be used	
Name of procedure(s):	No change from the original protocol.
Pre-anesthesia	
Anesthesia	
Maintenance anesthesia	
Methods used to monitor anesthetic depth	
☐ All animals are monitored continuously while under anesthesia. ☐ Supplemental heat is provided while the animal is under anesthesia. See DLAM website for list of DLAM/LAMS Approved Thermoregulatory Devices for Rodents.	

IX. SURGERY DESCRIPTION

If more than one surgery is being added, please copy the table below and answer questions 1-6 for each individual surgery. See *IACUC Policy for Conducting Survival Surgical Procedures in Rodents*. Please note that there are additional requirements for non-rodent species. Exsanguinations that require a skin incision to expose the vessel and perfusions need to be described as terminal surgeries.

1) Name of surgery:	Confirm if ☐ survival or ☐ terminal
2) Check the relevant boxes for this surgery:	
All of the following are required for survival surgery. Please provide scientific justification to omit or change. Terminal surgeries only require continuous monitoring under anesthesia (the last box). ☐ Disinfection of the surgical area/table.	

☐ Surgeon is properly prepared for each surgery. This includes, at a minimum, sterile gloves, mask, and disposable (or clean) lab coat.
☐ Animal is appropriately prepped for surgery by the following steps:
1. Provision of eye lubricant
2. Removal of the fur/hair
3. Disinfectant/ethanol wipe of the skin (3x for each scrub).
☐ Supplemental heat is provided while the animal is under anesthesia. See DLAM website for list of DLAM/LAMS Approved Thermoregulatory Devices for Rodents.
☐ All animals are monitored continuously while under anesthesia.

3) Anesthetic details [include drug name(s), dose (mg/kg), frequency, route] ☐ Confirm USP grade	
Pre-anesthesia	
Anesthesia	
Anesthetic maintenance	
Methods used to monitor anesthetic depth	
Methods used for intraoperative monitoring (USDA species only)	

4) How are the surgical instruments sterilized for survival surgery?

5) Describe the surgery in detail including skin incision, all manipulations, closure, and suture information.
There is no need to repeat details confirmed in Part 2 and 3 above.

☐ Confirm initial dose of analgesia will be given prior to making the incision OR justify if this cannot be done.

☐ Confirm sutures and/or wound clips will be removed 7-14 days postoperatively.

6) Analgesic regimen: *Provide initial dose prior to making the incision. If post-op analgesics cannot be used at all, justify in Section XIII Part 4: Justification for Cat E Procedures.* ☐ Confirm USP grade analgesics will be used.

A. Analgesic used	
B. Dose and route of administration	
C. Frequency and length of time provided	

X. ANIMAL CARE AND MONITORING

A. What adverse effects may occur as a result of the experiments and/or from surgery? Describe expected experimental effects, distress, pain, significant discomfort, morbidity, etc. For surgery, include what methods will be used to avoid tissue infection, inflammation, erosion, or accidental removal of any implants, and how they will be alleviated if present? If adverse effects occur, how will they be alleviated (e.g. with analgesia, nursing care, nutritional support or euthanasia)?

No change from the original protocol.

B. Humane endpoint criteria (e.g. tumor size and/or necrosis, % body weight gain/loss, body condition, inability to eat or drink, behavioral abnormalities, clinical symptoms, signs of toxicity, etc.) must be specified when the experimental manipulations could cause significant adverse effects or are potentially lethal. Clearly list the criteria used to determine when euthanasia will be performed even if prior to the experimental endpoint.

No change from the original protocol.

C. Describe the frequency and the length of the time that ALL animals will be observed in order to evaluate pain/distress during the lifespan of the protocol. Include post-operative care and monitoring required at least daily for 72 hours after surgery (where the day of surgery is considered Day 0). This monitoring must be documented on the surgery card (for rodents) or in the medical records (for large animals). Also, when applicable, include information about the general observation of animals during time periods when they are not involved in experiments.		
Procedure or Experiment name(s)	**Frequency of observations/monitoring** Include frequency of weighing if applicable. How will nursing care be provided and how will monitoring change if health changes?	**Criteria used to assess declining health** (e.g. weight loss, dyspnea, ruffled fur)
No change from the original protocol.		

XI. LOCATION OF ANIMALS

1. Are live animals ever used outside of the centralized facilities?	☐ Yes ☐ No ☒ Other location
NOTE: *Animals can only be outside of the centralized facility for less than 24 hours (or less than 12 hours for USDA species), unless the area is an IACUC approved satellite facility.*	

If you answered **yes** above, please complete question 1. If you answered **other location**, please complete question 2.

1A. Name of procedure or indicate if satellite housing (e.g. name of surgery, sacrifice/ tissue harvest, imaging, monitoring, etc.)	**Building and Room Number**	**Has the room already been approved by the IACUC?**	**Longest Period of Time Animals Would Be Present**
☐ sacrifice/tissue harvest		☐ yes ☐ no	
☐ survival surgery		☐ yes ☐ no	
☐ non-survival surgery		☐ yes ☐ no	
☐ satellite housing		☐ yes ☐ no	
☐ other: _____		☐ yes ☐ no	

1B. Provide justification below for removing animals from central facilities.

2. Provide description(s) and justification for field studies and use of other locations.
We are currently approved to work with primates at the Taricaya Rescue Center in Peru. We would like to expand to begin to collect samples at the ~11 primate rescue centers that are located throughout Peru.

XII. DISPOSITION OF ANIMALS FOLLOWING STUDY

Provide details of euthanasia for each species. **Even if the experimental plan does not include euthanasia, protocols must include an emergency plan in case euthanasia becomes necessary.** No animal may be adopted, reused, or given away without advance permission from DLAM, LAMS, or CBU.

- Copy and paste the chart below for each different species, if necessary.
- If an inhalant is selected as the euthanizing agent, a secondary method of euthanasia is required. See IACUC Policy on the Use of Inhalants for Euthanasia.

- Methods of euthanasia must be consistent with the AVMA Guidelines or otherwise scientific justification must be provided below.

☒ **No change in euthanasia method(s) from current protocol.**

☐ **A NEW euthanasia method is requested below.**

Species name	
Primary euthanasia method	
Confirm secondary euthanasia method when inhalant is used	☐ Cervical dislocation, decapitation, thoracotomy, exsanguination, or major organ removal will be performed following the primary method
Other euthanasia methods:	

☐ **A physical method of sacrifice will be used without prior anesthesia or sedation** (i.e. conscious cervical dislocation or decapitation). Please provide justification below. See *IACUC Policy on Conditionally Accepted Euthanasia Methods for Rodents* and *IACUC Policy for Maintenance of Blades for Use in Conscious Decapitation*.

☐ **Euthanasia is not expected or required. Emergency only.**

XIII. JUSTIFICATION FOR NUMBER OF ANIMALS

1. EXPLANATION FOR THE NUMBER OF ANIMALS REQUESTED. Explain how the number of animals requested was determined. Include justification for the group sizes, the number of groups per experiment, the number of repetitions, etc. The number of animals should be the minimum number required to obtain statistically valid results. Please include a description of the statistical analyses, including tests, power and probability levels utilized, if applicable. Include which animals belong in which pain/distress category (C, D, or E). You are encouraged to include a table or flowchart.

Sample size of 400 is based on determining the frequency of disease in a large population when the frequency of the disease is unknown. For a confidence level of 95%, and using an absolute precision of 5%, we will need 384 individual animals. This was calculated using Open Epi sample size calculator for determining proportions in a population.

2. TOTAL NUMBER OF ANIMALS USED FOR BREEDING. Provide the total number of animals bred under this protocol. Please provide a clear distinction between which of the animals bred will be used in the experiments above and which are used for maintenance or culled only.

Mouse		Rat		Other	

If bred in-house, provide a table/chart below that organizes the number expected from breeding.

Be sure to include all parents and offspring even if not directly used in experimental procedures. Estimate litters per female, litter size, and how many animals born that may be culled based on Mendelian genetics or other methods. The IACUC suggests estimating high using 10 pups per pregnancy, if unknown. Please use this guideline or give justification for a different estimate. All animals born have to be accounted for in the protocol, even if not used in the experiments.

3. TOTAL NUMBER OF ANIMALS. Please provide the total number of animals required listed by species. For each species, identify the number of animals that will be utilized in each USDA pain/distress category. Be sure these category subtotals are equal to the total number requested. ALL animals, regardless of whether they are used in experiments, MUST be accounted for in the protocol. **Remember to include all animals used for breeding/maintenance.**

USDA Category C – Procedures with minimal, momentary, or no distress.
USDA Category D – Use of appropriate anesthetics, tranquilizers, or analgesics to alleviate pain and/or distress.
USDA Category E – Animals may experience unrelieved pain and/or distress without intervention.

Species name	Peruvian Neotropical Primates		
Category C			
Category D	400		
Category E			
Total number requested	400		

XIV. SEARCH FOR ALTERNATIVES

Federal regulations mandate that you describe how the lack of alternative methods was verified for each potentially painful/distressing procedure or disease **(ONLY for Category D and/or E procedures).** Category C procedures do not need an alternative search.

A. GENERAL SEARCH INFORMATION	
The database(s) searched	No change from the original protocol.
The date that the search was conducted	
The years covered by the search	

B. DESCRIBE YOUR SEARCH STRATEGY BELOW

Recommended Search Strategy ➔ "*procedure*" and "*species*" and "*alternative(s)*" = # references

The Committee must be able to understand the keywords and search strategy used. The number of references for each keyword combination must also be provided.

Example: Use of anesthesia in mice = *[anesthesia + (mouse or mice) + (alternative or alternatives)] = # of references retrieved.*

C. PROVIDE A NARRATIVE FOR EACH SEARCH. The Committee must be readily able to assess whether the search topics were appropriate and whether the search was sufficiently thorough.

XV. PRINCIPAL INVESTIGATOR ASSURANCE OF COMPLIANCE

As the individual responsible for this project, I confirm that:

☒ *The information contained in this protocol is true and accurate, and that, to the best of my knowledge, it conforms to Tufts University/Tufts Medical Center IACUC, NIH, USDA, and MDPH policies on the use of animals in research and teaching.*
☒ *I have considered alternatives to the biological models used in this project, and have found these other methods unacceptable on scientific or educational grounds.*
☒ *I certify that I have determined that the research proposed herein is not unnecessarily duplicative of previously*

reported research.

☒ *I accept responsibility for ensuring that all personnel involved in this project will be trained regarding any potential chemical hazards, relevant safety practices and emergency procedures. I confirm that the relevant DLAM/LAMS/CBU Safety Plan(s) will be followed.*

☒ *I accept responsibility for ensuring that all personnel involved in this project will be trained regarding any potential biological hazards, relevant safety practices, and emergency procedures. If applicable, I confirm that all relevant Institutional Biosafety Committee requirements will be followed.*

☒ *All personnel named above have agreed to participate in this study and are aware of procedures that are approved. All individuals who will be involved with the animals used in the project have been instructed in the humane care, handling, and use of animals, and I have reviewed their qualifications.*

☒ *No change will be made to procedures, care, or housing without prior written notification to and approval by the Institutional Animal Care and Use Committee (IACUC).*

☒ *I understand that it is non-compliant to release an IACUC approval date without documentation of a congruency comparison conducted by the IACUC Office. For more information, please see the Policy on Requiring a Congruency Comparison Prior to Release of IACUC Approval Dates.*

☒ *I understand that failure to comply with IACUC policies and procedures will jeopardize Tufts University, Tufts University-Tufts Medical Center, or the Human Nutrition Research Center on Aging at Tufts University's Animal Welfare Assurances on file with the NIH, and may lead to revocation of my privileges to conduct animal research at this institution.*

Marieke Rosenbaum	4/20/18
Principal Investigator (*provide electronic signature*)	Date

By typing your name you are submitting an electronic signature that confirms your understanding and adherence to the above statements and IACUC policies. This is considered legal documentation and confirmation of your agreement to execute all activities as approved.

Tufts
UNIVERSITY

Office of the Vice Provost for Research
Institutional Animal Care and Use Committee

November 18, 2019

To Whom It May Concern:

This letter verifies that Dr. Marieke Rosenbaum's animal protocol #G2017-42 entitled "Infectious Diseases in Neotropical Non-Human Primates in Peru" has been reviewed and approved by Tufts University Institutional Animal Care and Use Committee (IACUC).

Dr. Patricia Mendoza is listed as personnel on this protocol.

IACUC protocol #G2017-42 was approved on April 14, 2017 and will expire on April 14,2020.

Please contact me if you need further assistance.

Best regards,

Ann Holm, CPIA
IACUC Coordinator
The Cummings School of Veterinary Medicine
Tufts University
Grafton, MA
Tel: 508-887-4639
ann.holm@tufts.edu

Re: [EXTERNAL] Re: CITES Permit App 56679D

Cate, Emily B <emily_cate@fws.gov>
Fri 9/18/2020 1:32 PM
To: Rosenbaum, Marieke H. <Marieke.Rosenbaum@tufts.edu>

Good afternoon,

Thank you for getting back to me, I am sorry that the emails were difficult to find, but I am glad you found them! I can make the changes on my end and there is no need for you to resubmit or alter the application. I will review the application in its entirety and will certainly let you know if there's anything we need (if I send an email, I will follow it up with a call).

Thank you,
Emily

From: Rosenbaum, Marieke H. <Marieke.Rosenbaum@tufts.edu>
Sent: Friday, September 18, 2020 11:54 AM
To: Cate, Emily B <emily_cate@fws.gov>
Subject: RE: [EXTERNAL] Re: CITES Permit App 56679D

Hi Emily,

Thanks again for the call and my apologies for missing your emails. I did end up finding them but it was hard!

After talking with my team we would like to proceed as you recommend with only the four Appendix I species: Goeldi's monkey (*Callimico goeldii*), bald uacari (*Cacajao calvus*), mantled howler monkey (*Alouatta palliata*), and the yellow-tailed woolly monkey (*Oreonax flavicauda*). Do you need me to alter the application and resubmit or are you able to make those changes on your end? Let me know, and thanks again for all your help.

Best,
Marieke

From: Cate, Emily B <emily_cate@fws.gov>
Sent: Tuesday, August 4, 2020 3:20 PM
To: Rosenbaum, Marieke H. <Marieke.Rosenbaum@tufts.edu>
Subject: Re: [EXTERNAL] Re: CITES Permit App 56679D

Good afternoon again Dr Rosenbaum,

Apologies, I forgot to include in my previous email that we are extending the date from which we will need to receive information by. We are extending it by another 45 days, starting today. Please see below for details If you have any questions or concerns, please let me know

In accordance with 50 CFR 13.11(e), if the requested information is not received by this office by **September 18, 2020**, your application will be abandoned and administratively closed. Once a file is closed you will need to submit a new application and all required fees for the Service to consider your proposed activity. Please refer to permit number 56679D in your correspondence.

Regards,
Emily

From: Cate, Emily B <emily_cate@fws.gov>
Sent: Thursday, July 23, 2020 2:31 PM
To: Marieke Rosenbaum <marieke.rosenbaum@tufts.edu>
Subject: Re: [EXTERNAL] Re: CITES Permit App 56679D

Good afternoon Dr. Rosenbaum,

Thank you for reaching out and apologies for my delay in responding to your inquiry. I was actually planning to write to you regarding your application. After some internal discussion, we were wondering if it may be possible to tailor your import permit to specific species, as the majority of primates are listed under Appendix II of CITES and not designated under the U.S. Endangered Species Act (ESA). As a friendly reminder, species that are Appendix II and with no ESA listing, may be imported as long as you obtain a CITES export permit from the foreign country and comply with the clearance and inspection procedures at the U.S. designated port.

After reviewing the IUCN/SCC Primate Specialist Group's Primates of Peru Taxonomy list provided in your application, four species are designated as Appendix I under CITES and Endangered on the ESA, which would require an import permit. The four species are: Goeldi's monkey (*Callimico goeldii*), bald uacari (*Cacajao calvus*), mantled howler monkey (*Alouatta palliata*), and the yellow-tailed woolly monkey (*Oreonax flavicauda*).

It will be a more straight-forward process on our end to keep the request limited to specific species; however, it is up to you on how you would like to structure the request. Pending approval, we can put whole families, genuses, etc. on the face of the permit, but the analysis required will likely take longer. Again, it is up to you as to how you would like to proceed.

Thank you very much for your patience and apologies again for the delay in processing your application. Please feel free to reach out anytime with any questions or concerns, or if I can provide clarifications.

Regards,
Emily

From: Marieke Rosenbaum <marieke.rosenbaum@tufts.edu>
Sent: Saturday, July 11, 2020 12:19 PM
To: Cate, Emily B <emily_cate@fws.gov>
Subject: Re: [EXTERNAL] Re: CITES Permit App 56679D

Hi Emily,

I just wanted to politely inquire about the status of my application for a CITES permit - are you able to provide a general timeline for when we can expect to hear back about the application?

Thank you for your help,
Marieke

On Tue, Apr 28, 2020 at 8:25 AM Cate, Emily B <emily_cate@fws.gov> wrote:

> Dear Dr. Rosenbaum,

Thank you for submitting this information. I will review it and let you know if I have any follow-up questions Please let me know if you have any questions or concerns

Thanks,
Emily

From: Marieke Rosenbaum <marieke.rosenbaum@tufts.edu>
Sent: Saturday, April 25, 2020 2:32 PM
To: Cate, Emily B <emily_cate@fws.gov>
Subject: [EXTERNAL] Re: CITES Permit App 56679D

Dear Emily,

Please see attached a letter explaining the information you have requested. I have also attached IACUC documentation. Please note that the IACUC expired this month and we are working to submit another application before conducting any additional primate sampling.

Thank you for your time.

Sincerely,
Marieke

On Fri, Mar 13, 2020 at 12:33 PM Cate, Emily B <emily_cate@fws.gov> wrote:

> Dear Dr. Rosenbaum,
>
> I have your application dated 09/30/2019, received 10/07/2019, regarding the proposed import of biological specimens of Peruvian Neotropical primates. I apologize for the delay in processing your application.
>
> Please provide the following information so that I can continue to process your application:
>
> 1. Please clarify if and how any remuneration, either financial or in-kind, was provided for the collection of samples.
> 2. Did any mortalities or injuries occur due to the collection of the samples for the animals already sampled invasively at the rescue centers?
> 3. For the animals sampled invasively/proposed for future samples at the rescue centers, was the collection done/is the collection proposed to be done as part of routine general husbandry practices or were the animals/will the animals be anesthetized specifically to collect the samples? Please also elaborate on the methods used to anesthetize the animals.
>
> In accordance with 50 CFR 13.11(e), if the requested information is not received by this office by **April 27, 2020**, your application will be abandoned and administratively closed. Once a file is closed you will need to submit a new application and all required fees for the Service to consider your proposed activity. Please refer to permit number 56679D in your correspondence.
>
> Respectfully,
> Emily
>
> **Emily Cate** | Permits Biologist
> U.S. Fish and Wildlife Service | International Affairs
> Division of Management Authority | Branch of Permits

5725 Leesburg Pike, MS:IA
Falls Church, VA 22041-3803

--
Marieke H. Rosenbaum, DVM, MPH, MS
Assistant Professor, Dept of Infectious Disease and Global Health
Cummings School of Veterinary Medicine at Tufts University
200 Westboro Road | North Grafton, MA 01536
Marieke.Rosenbaum@tufts.edu | 617.605.9089