



3911919-693600  
Duke University  
Duke Lemur Center  
3705 Erwin Road  
Durham, NC 27705

THE DUKE  
INITIATIVE FOR  
NON-INVASIVE  
NEURAL IMAGING  
SEEKS TO  
DISCOVER WHAT  
GOES ON IN THE  
MINDS OF MOUSE  
LEMURS.  
STAY TUNED!

E = MC<sup>2</sup>

DO YOU  
HAVE ANY  
CRICKETS  
IN YOUR  
POCKET?

I WANT TO  
HELP CURE  
ALZHEIMER'S!



# ANNUAL REPORT 2013

DISCOVER | PROTECT | ENGAGE



LEMUR.DUKE.EDU



## MADAGASCAR: 15 YEARS LATER

Time flies. We all know the feeling. We look back on our college years, and it seems like yesterday. We look at our high-school aged kids, and it seems like just a day or two ago that we were changing their diapers. I had a most memorable “time flies” experience this summer when I went to Madagascar — my first trip there since 1998! Can it really have been that long?

What brought me back to Madagascar after all this time? For years I have wanted to return, but responsibilities (not the least of which was the birth of my son Dylan, in 1999) made it impossible. This year, though, everything fell in place for a return visit. First and foremost, I had the opportunity to finally tour our SAVA Conservation Initiative. This I did with Charlie Welch, Erik Patel, and, as an added bonus, Karl Bates of Duke News and Communications. Charlie’s article in this issue provides complete details on this phase of the trip. There’s not really much for me to add to Charlie’s excellent account, beyond my own personal reactions.

I would sum these up as being deeply *impressed* by all that is getting done with very limited resources (a little goes a very long way in Madagascar!); *grateful* for the amazing leadership and talent that Charlie and Erik bring to the project; and *optimistic* that at the end of the day, our efforts in Madagascar will make a positive difference in the lives of the Malagasy people, and of course, in the hope for lemurs’ long-term survival. I must also add the word *amazed* to my list of reactions, as it was indeed amazing to see first-hand just how much our work there is valued by the Malagasy people whose lives we are touching.

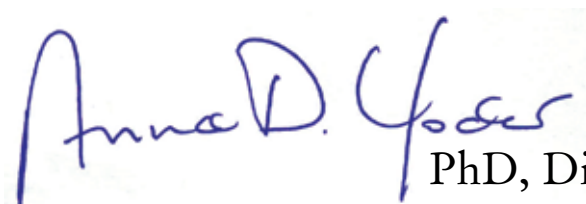
At virtually every stop that we made, the DLC logo was proudly displayed, and the words “Duke Lemur Center” were on the lips of all, invariably spoken with a mix of admiration and appreciation. The SAVA region is a relatively vast geographic area in Madagascar, and our footprint is correspondingly large --- so, finally, let me add the word *proud* to the list. I am tremendously *proud* of the work that the DLC is doing in Madagascar, none of which would be possible without the support of our generous donors.

The second opportunity, in addition to the SAVA



tour, was the International Prosimian Congress, which convened August 5-9, 2013 at the ValBio Research Station at the edge of Ranomafana National Park in southeastern Madagascar. In the words of the organizers, “The International Prosimian Congress is recognized as the most important global meeting for primatologists studying any aspect of prosimian biology to present and share their experiences.” This was the first such congress to be held in more than five years, and I simply could not ignore the chance to attend and present work, ongoing in my lab in collaboration with postdoctoral fellow Dr. Jason Brown, on the likely effects of climate change on lemurs and their future distributions (more about this once our paper is accepted for publication!) In addition to my own participation, the DLC was thoroughly represented by staff, students, and postdocs. By my count, there were at least 12 DLC associates presenting at the Congress.

Prior to the Congress, the DLC made a commitment to sponsor Malagasy registration fees in order to promote student attendance at the meeting. Accordingly, the DLC logo was everywhere, and I cannot begin to count the number of times that I was thanked for our support by the Congress organizers and by the Malagasy student participants. Again, a little bit goes a very long way in Madagascar. The sophistication, excellence, and passion that the Malagasy students brought to their presentations were impressive beyond description. They are the future of conservation biology in Madagascar, and if the quality of the Malagasy science as represented at the Congress is any predictor of the fate of Madagascar’s biodiversity, then I believe we have reason to feel very optimistic. Certainly, I came away with renewed confidence, and also with renewed passion for supporting the Malagasy people as they prepare for a future that assures their own health and welfare, as well as that of the lemurs. That is truly the only way forward.

  
PhD, Director

## Leaping Forward: DIVERSIFYING THE DLC’S EDUCATIONAL OPPORTUNITIES

BY NIKI BARNETT, EDUCATION PROGRAMS MANAGER/  
DEVELOPMENT OFFICER

Here at the DLC we are constantly moving forward. We have made extraordinary leaps in our research programs, conservation efforts, and most recently, in our educational programming. This past year was extremely busy, but very exciting! Our tour program thrived. Over 18,000 visitors made their way to the Duke Lemur Center from all over the globe, 5,000 more than the previous record-breaking year! Not only did they come for tours, but also to partake in our wonderful new programming.

Last fall we piloted our Primates for Preschoolers programs. These programs enable children ages 3-5 a way to connect with lemurs in a new way. Our hands-on, parent-guided activities, focusing on lemur research and enrichment, provide children with a level of engagement that is usually lacking for this age group in our standard tours.

This summer, after more than a year of planning, we launched our Leaping Lemurs Summer Science Camp. Both sessions we offered quickly filled up, and were judged by campers and their parents, as well as participating DLC staff, to be a great success! Rising 6th-8th graders from all over the country made their way to us to learn all about lemurs and the DLC! Each week-long session covered all aspects of the Lemur Center, from lemur husbandry and research at Duke to our conservation activities in Madagascar. The favorite activity of the campers proved to be the making and feeding out of aye-aye diets and enrichment. Next year we hope to expand on our camp program and offer similar camps for children of younger ages.

This summer we also started our Evening with the Experts seminar series. These classroom-based lectures give adults a way to delve deeper into what makes the Lemur Center so special. The seminars kicked off in July with Conservation Coordinator, Charlie Welch introducing people to the important conservation work being conducted in the SAVA region of Madagascar. In August, Lead Primate Technician Julie McKinney, talked about All things Aye-aye to a sold out crowd! Next up is Behavioral Management Coordinator, Meg Dye, and her presentation, Are you smarter than a lemur? This session will focus on how positive reinforcement training has enabled us to better manage our colony and to assist our researchers.

We are so excited about the response to our new programming! Stayed tuned for our winter classroom programs geared towards 6th-12th grade students.



**18,741**  
PEOPLE VISITED  
THE DLC  
LAST YEAR

I have known for the majority of my life that I wanted to study primates. Ever since I read a book by Jane Goodall as a child, I have been hooked. This group of animals never fails to amaze and fascinate me— how they can be like us in so many ways and at the same time teach us how we are unique. Duke was a natural choice for college. It is a very good place to be if, like me, you find yourself in love with primates. Unless you go to Madagascar itself, you will find more lemurs here than anywhere else in the world.

I knew immediately that I wanted to work at the Lemur Center. In fact, I landed a job as a tour guide the day before I even set foot on Duke’s campus. It has been a wonderful experience, seeing these amazing creatures every week and getting to share this passion with the Center’s visitors. I am also involved in other primate-related opportunities at Duke. I am the president of the primate conservation club Roots & Shoots, I work in a lab dealing with the Jane Goodall Institute’s chimpanzee data, and I am majoring in Evolutionary Anthropology. Duke and its lemurs have put me on my way to becoming a primatologist.



By Kyle Smith,  
Lemur Landing  
Work Study Student



# Thank You

## TO OUR AMAZING VOLUNTEERS!

Marissa Acciana  
Melissa Ballantyne  
Heather Bell  
Samrath Bhattacharya  
Nutishia Blake  
Rachel Blake  
Jana Bradley  
Christina Burt  
Julie Byrne  
Alexis Cacchione  
Mary Elyn Cacchione  
Mark Chandler  
Monica Chen  
Laura Chesnut  
Bill Cramer  
Dalia Dahir  
Morgan Daly  
Elyse Dankoski  
Elora Dash  
Mark Delves  
Ethan Doherty  
April Dube  
Tim Duett  
Betsy Englishman  
Herb Englishman  
Pamela Entzel  
Susan Fitzgerald  
Bailey Gatens  
Soren George-Nichol  
Simone Godwin  
Kylie Grady  
Savannah Gupton  
Lauren Hagedorn  
Emily Hardgrove  
Jody Harper  
Lisa Hathaway  
Scott Hennes  
Tatiana Henry  
Katrina Hillhouse  
Carol Holman  
Kristen Hopper  
Allison Jaillet  
Cackie Joyner  
Arthur Juliani  
Amber Kenney

## DIVISION OF FOSSIL PRIMATES NEWS

BY GREGG GUNNELL, DIRECTOR DIVISION OF FOSSIL PRIMATES

I first went to the badlands in Wyoming in 1975. I was 20 years old with no clue what I wanted to do with my life. I returned to the Wyoming badlands this past summer for the 33th time in 38 years. I sat on the top of Continental Peak (8431 feet) – the climb up gets a bit harder each year but the view is worth the effort – and wondered why I had spent the better part of all those past summers camping in the badlands. It’s a simple answer really. The thrill of finding a fossil cannot be replaced by any other feeling. After all of those years I still gasp and my heart beats a little faster when I see a row of gleaming teeth of some long dead animal shining up at me under a noon day sun. Even now, even after all of these years the thrill remains.

I don’t remember the first fossil I ever found in Wyoming. It was probably a piece of turtle shell since they often litter the landscape but I do remember the first mammal I ever found – there were some large, black, wrinkled-looking teeth lying on the surface of an eroding badland hill and I was told they belonged to Coryphodon. I discovered that Coryphodon was among the largest mammals that lived in the early Eocene of western North America some 52 million years ago. It was cow-sized and like cows it was an herbivore but beyond that Coryphodon had nothing to do with cows. It was member of an ancient order of mammals, now extinct, called pantodonts. Even though I was certain I’d become world famous because of my find (I didn’t), I quickly learned that Coryphodon wasn’t all that rare nor was it particularly hard to find given that it was so large. All of that mattered not to me because it was my first fossil and to this day I still have a soft spot in my heart for Coryphodon.

Even though it is now harder to get away every year and not possible to go for six week field seasons anymore, I still feel the pull of the badlands. This past summer I returned for the first time



in three years and remembered another reason why I enjoy going there as often as I can. It is the history of discovery in the American West that enhances the field work experience. One of the areas in SW Wyoming where we worked this summer was one of the first places where fossil mammals were found in North America beginning in the late 1860’s. The other area we worked was a critical route through the Rocky Mountains for early settlers traveling west after the Civil War. The remnants of the Oregon, Immigrant, and California Trails can still be seen at South Pass.

Add to that my own modest history of field work with that of my paleontological forbearers and a long continuity of exploration can be traced into the past in Wyoming. The paleoanthropologist whose office I now occupy at Duke (Elwyn Simons) was the advisor to my advisor at the University of Michigan (Philip Gingerich), both of whom took part of their training from Glenn Jepsen at Princeton University. This past summer I was lucky enough to go to Wyoming with five of my former students – Jonathan Bloch (University of Florida), Doug Boyer (Duke University), Kathleen Muldoon (Dartmouth College), Mary Silcox (University of Toronto) and John-Paul Zonneveld (University of Alberta) – all of whom are professors at major universities and who are now bringing their own students with them to Wyoming. It is the history and the legacy of Western American field work that brings us all back each summer – that and the thrill of discovery. As one of my close colleagues always reminds me, primates like to pick up shiny objects – why should humans be any different than our other primate relatives?

## HIBERNATING LEMURS HINT AT THE SECRETS OF SLEEP

BY ROBIN SMITH, DLC SCIENCE WRITING AND COMMUNICATIONS

(FOR MORE, SEE BOBBY SCHOPLER’S ARTICLE “SLEEPLESS IN TSINJOARIVO IN THE DLC ANNUAL REPORT, 2012)

By studying hibernation, a Duke Lemur Center team is providing a window into why humans sleep. Observations of little-known primates, the dwarf lemurs (*Cheirogaleus* spp), both in captivity at the DLC (*Cheirogaleus medius*) and in the wild (*Cheirogaleus sibreei*) have revealed that these squirrel sized nocturnal lemurs found only in Madagascar, go for days without the deepest part of sleep during their winter hibernation season. The findings support the idea that sleep plays a role in regulating body temperature and metabolism.

Despite decades of research, why we sleep is still a mystery. Theories range from conserving energy, to processing information and memories, to removing toxins that build up when we’re awake. “If we spend nearly a third of our lives doing it, it must have some specific purpose,” said lead author Andrew Krystal, a sleep researcher at Duke.

One theory is that sleep helps regulate body temperature and metabolism. In a study that appeared September 4th in the journal PLOS ONE, researchers have found support for this idea in the fat-tailed dwarf lemur (*Cheirogaleus medius*). The closest genetic relative to humans that is known to hibernate, the fat-tailed dwarf lemur spends up to seven months each year in a physiological state known as torpor, where the regulation of body temperature stops and metabolism slows down.

In torpor, these lemurs can drop their heart rate from 120 to a mere 6 beats per minute, and breathing slows to a crawl. Instead of maintaining a steady body temperature like most mammals,



their bodies heat up and cool down with the temperature of the outside air, fluctuating by as much as 25 degrees Celsius in a single day.

For most mammals, a change in body temperature by more than a few degrees for any period of time would be life-threatening. But for the fat-tailed dwarf lemur, hibernation is a way to conserve energy during Madagascar’s long winter dry season, a time of year when food and water are in short supply.

If thermoregulation is one function of sleep, the researchers asked, can dwarf lemurs in torpor get away with less sleep?

To find out, they studied dwarf lemurs hibernating in the wild on the west coast of Madagascar (*Sibree’s* dwarf lemur, *C.sibreei*), and also non-torpid animals sleeping at the Duke Lemur Center (the fat-tailed dwarf lemur, *C. medius*). The researchers measured brain activity, oxygen intake and other vital signs.

They found that dwarf lemurs in torpor went for days without the slow-wave, low-amplitude brain activity associated with deep

sleep. Hibernating lemurs did show periods of brain activity consistent with the phase of sleep known as rapid eye movement (REM) sleep -- when most dreaming is believed to occur -- but only when winter temperatures rose above 25 degrees Celsius.

As a next step, the team is returning to the highlands of Madagascar to study another group of hibernators -- a family of small hedgehog-like animals called tenrecs.

By identifying similarities between dwarf lemurs and other hibernating animals, researchers may one day be able to induce hibernation-like states in humans. Being able to push humans into standby mode by temporarily reducing heart rate and brain activity could buy time for patients who have suffered head trauma or heart attacks, extend the shelf life of transplant organs, or even open the door to long-distance space travel.



# Thank You

TO OUR AMAZING  
VOLUNTEERS!

Elizabeth Klinck  
George Kolasa  
Whitney Lamb  
Rachel Manchester  
Alanna Marron  
Patricia Massard  
Morgan McCafferty  
Matthew McConnell  
Sheima Mehrizi  
Rebecca Newton  
Holly Noel  
Jennifer Nunez  
Andrew Odriscoll  
Morgan O'Neill  
Matthew O'Neill  
Janet Page  
Brittany Parsons  
Patty Pearthree  
Moiria Pelton  
Felicia Regan  
Sheena Riddick  
Robert Riesen  
Anne Rosenburg  
Hannah Schanzer  
Rhonda Sherman  
Ella Simkus  
Jamie So  
Madison Stanley  
Michelle Stiles  
Allison Stitt  
Laura Strickland  
Alissa Tepedino  
Brian Thompson  
Grant Thurston  
Tyne Tyson  
Michael Umphrey  
Katherine Vayda  
Tezin Walji  
Jennifer Walker  
Kay Welser  
Nicole Whinery  
Kathy Windsor  
Anna Elyse Yarbrough  
Katerina Zapfe

## SUMMER INTERN PROGRAM

BY MEG DYE, STUDENT PROJECT COORDINATOR/ANIMAL BEHAVIOR AND ENRICHMENT COORDINATOR

On August 3, 2013 Duke Lemur Center staff, graduate students and faculty gathered for the 2nd Annual Intern Project Symposium. The Symposium marked the conclusion of a 10-week summer internship by 19 participants. The summer interns were both local and from out of state and represented a variety of Universities including UNC, Duke, NCSU, DePauw, Clemson, Tuskegee and George Washington University.

During the 10 weeks with us the interns focused their time and projects with a particular area of choice including Data Research, Field Research, Husbandry, and Animal Training and Enrichment. In addition to learning and helping in a specific area, the interns came together every Tuesday to listen to a seminar presented by a department manager. The goal of the seminar series was to teach the interns about all aspects of the DLC and how all the departments are closely intertwined to achieve the DLC's goals of research, education and conservation.

All of the 2013 summer interns did an excellent job contributing to the daily activities of the DLC as well as contributions to what we know about the animals that live here. We are already looking forward to our 2104 Summer Intern Program!

Upon the conclusion of the summer internship program, we were pleased to hear positive feedback from the participants, including the following:

The Husbandry Internship definitely exceeded my expectations! I was truly amazed at how much animal contact we were given as husbandry interns, and I loved that I saw the animals everyday.  
-Jamie So, Husbandry Intern



..As far as getting to spend time with the animals, learn a lot about the facility, and actually do research, all the expectations I had about the internship were definitely met... Overall I would definitely recommend the internship to any of my friends interested in primatology! I am going to miss the place...

-Arthur Juliani, Data Intern

I enjoyed this internship so much, it was genuinely sad to leave! I love telling people about it and about lemurs! I really enjoyed meeting everyone and learning about the amazing work that everyone has done and is doing.

-Katrina Keith-Hillhouse, Field Research Intern

I have nothing but compliments and praises for this internship! It was absolutely more than I had expected and I love every minute. To be able to work so close with the lemurs and do so much for them, as well as working with the staff was just amazing.

-Holly Noel, Husbandry Intern

I think everything this summer was fantastic, I got more from this experience than I could have expected. The Summer Seminar series was great; I loved learning about the different components of the DLC...I had no idea just how involved the DLC is in Madagascar.

-Michelle Stiles, Animal Training and Enrichment Intern

## Volunteer Spotlight

TOTAL  
VOLUNTEER  
HOURS:  
**7976**

### JENNIFER NUNEZ

**Volunteer role at the DLC:** I give regular tours once a week and also work in the veterinary department, currently on a research project regarding the mortality of the Coquerel's sifakas.

**Length of volunteering:** I have been volunteering since the fall of 2009.

**Why you volunteer at the DLC:** My volunteer day at the Lemur Center is often the happiest day of my week. I love introducing people, young and old, to these amazing creatures and telling the tales of their native home in Madagascar. Not only do these beautiful primates quickly capture people's hearts and imagination with their sweet faces, quirky jumps and playful antics, but the world they come from is truly fascinating as well, the perfect image of a land filled with wonder that we desperately need to protect. It is a rare profession when one can both fill people with joy and excitement, while still educating and promoting the conservation of our most vulnerable lands. I've been fascinated by lemurs since I first learned about them in my college evolution class, and to be able to work with them on a daily basis, live and in the flesh, is more than I could have ever hoped for.

**Favorite species:** Coquerel's sifaka

**What do you do for a living?** Geriatric Physician



### TIMOTHY DUETT

**Volunteer role at the DLC:** I am a Technician Assistant (TA) so I help the primate technicians with whatever tasks need to be done on a given day.

**What do you do for a living?** I am currently a junior at NC State University majoring in Biological Sciences.

**Length of Volunteering:** I began volunteering in May, so I still discover new and exciting things about the lemurs each week!

**Why you volunteer at the DLC:** I have always been interested in wildlife, and I think the research and conservation efforts being done here at the DLC are extremely important. This opportunity is also helping me gain valuable experience for my future pursuits.

**Favorite Species:** Hard to pick a favorite, but I really enjoy any time I get to spend around the Sifakas. The comical way they leap around never ceases to make me laugh.





Duke Lemur Center  
Statement of Operations July 2012 - June 2013

REVENUE		
Annual University Allocation	\$	1,561,942
Other University Support		338,074
Endowment Income		148,210
*Annual Giving (donations)		382,207
Tours, Education & Merchandising		308,840
Research & Research Cabin Fees		57,157
Grants		
Government		520,875
Foundations		3,122
Other		35,283
Reserve from prior year		1,153,163
Total Income		4,508,873
EXPENSES		
Salary & Fringes		1,866,018
Facilities (building & utilities)		469,906
General Operations		133,220
Animal Care & Operations		155,838
Development & Public Relations		47,531
Education & Merchandising		112,937
Conservation		85,335
Undergraduate Research Awards		4,085
Other Research		69,186
Equipment/Acquisitions		50,547
Capital & Renovation Projects		88,835
Reserve for future programming		1,425,435
Total Expense		4,508,873

\*includes foundations, alumni, non-alumni, industry, & other donations non grant

# FENCING IN THE FUTURE

BY GREG DYE,  
OPERATIONS MANAGER



Have you ever heard the saying, “good fences make for good neighbors”? This is especially true when your neighbor houses over 250 lemurs, as many as 80 of which might be free ranging in forested enclosures right next door. Since May, the Lemur Center has been slowly replacing nearly three miles of fence line installed in the late 1980s. All new fencing is being buried one foot in the ground to keep raccoons and foxes, which might have developed a taste for monkey chow over the years, outside our boundaries.

Why so much fencing? First off, there is the brand new eight foot high perimeter fence surrounding the entire 70 acre Lemur Center campus (replacing the old six foot high perimeter fence). Then there are the entirely separate fence lines (all six feet high and topped with electronet to deter lemurs from climbing) used to establish the nine free ranging lemur enclosures in Duke Forest. Not all this fencing is being replaced, but over a mile of it is. Even more fencing is needed where two lemur enclosures are adjacent. In this case, two parallel fence lines are constructed resulting in a ten-yard wide “no lemurs land” corridor between each enclosure to prevent lemur neighbors from fighting through the wire.

These forested enclosures allow the lemurs to live nearly “wild” with their families and social groups in acres of Duke Forest. The ability for the DLC to house a large portion of its lemur collection in this way is another feature that makes the Center so unique and valuable to its researchers and guests. These enclosures encourage natural behaviors such as foraging and climbing and allow researchers the rare opportunity to observe and collect data that can otherwise only be collected in the forests of Madagascar. For our guests, touring these enclosures and being able to get within a few feet of the lemurs can be life-changing.

So the next time you visit the DLC and are admiring the lemurs high in the trees, be sure to take notice and appreciate the new fence lines that make it possible.

# DIRECTOR ANNE YODER VISITS DLC’S SAVA CONSERVATION PROJECT

BY CHARLIE WELCH, CONSERVATION COORDINATOR

In August, DLC Director, Anne Yoder; Duke’s Director of Research Communications, Karl Bates; and myself set off for Madagascar for a whirlwind two weeks: first to tour DLC conservation projects in the SAVA region, then to attend the Prosimian Congress in Ranomfana National Park at the nearly opposite end of the country (see Dr Yoder’s article this issue). After the seemingly endless series of flights to Madagascar from Durham, we collapsed in our hotel beds in the capital of Antananarivo (Tana) at midnight, only to be rudely awoken just a few hours later to get back on the road to catch an early morning flight to Tamatave. No time for jetlag!

After a chaotic check-in at the Tana airport, and 40 minute flight, we were met in Tamatave by Madagascar Fauna Group (MFG) project manager Maya Moore, and whisked to the MFG long-term conservation project at Parc Ivoloïna 12 Kilometers north of town. Andrea Katz and I began working at Ivoloïna in 1987, as part of a collaboration between the Duke Primate Center and Madagascar’s department of Water and Forests. Over the years, Ivoloïna was developed into a multi-faceted conservation project that is now managed by the MFG, of which the DLC is a founding and managing level member. The conservation work at Ivoloïna continues to grow and evolve under Maya Moore’s capable guidance. While at Ivoloïna we visited the Environmental Education Center, where Malagasy students are introduced to Madagascar’s unique natural world. We toured the tree nursery and visited the new Ivoloïna Environmental Training Center- with meeting space, a laboratory, and a dormitory. And of course we visited the fabulous zoo with its beautiful displays of lemurs and other creatures of the eastern rainforest. Anne got the opportunity to meet many of the capable Malagasy staff who make Ivoloïna such a successful conservation initiative. At the conclusion of our tour, I think I can say that Anne left Ivoloïna with a far different impression than she previously had.

The next morning we caught a flight to

Sambava, the heart of the SAVA region, and the base for our conservation project. Project leaders Erik Patel and Lanto Andrianandrasana met us at the airport, and gave us a tour of the impressive new project office. The office serves as a base of operations, and includes guest rooms for project collaborators and visitors. The next morning we set off for the town of Andapa, center of many of our project activities. On the beautiful winding mountain drive up we stopped to visit a tree nursery that is part of our collaboration with Graine de Vie, and a Green Charcoal project that we are supporting, to reduce cutting of trees for cooking fuel. Upon arriving in Andapa, we met the two Duke Engage student volunteers working with the project over the summer, Sophia Staal, and Cameron Tripp. Sophia is helping to build a business model to promote the sustainability of our fish farming ponds, and Cameron is observing bamboo lemurs and mapping boundaries in a nearby private reserve, Antanetiambo. The following day we visited the demonstration fish pond, which is the initial stage of our fish farming initiative. A first successful harvest of the native Paratalapia being raised there has already taken place, with many more harvests to come. We also visited the Antanetiambo reserve, which is on property owned by Desiré Rabary, who visited DLC several years ago, when he was in the US to accept a Seacology conservation award.

The next day we traveled back to Sambava, and, amazingly, had a bit of free time in which to relax. Our flight back to Tana the following day was out of Antalaha, on the southern edge of the SAVA. We made the two hour drive early that morning, but before going to the airport we paid a visit to a botanical garden called Macolline, which is owned and operated by Madam Marie Helene. We had arranged to meet Marie Helene there to discuss the possibility



of our helping to support her efforts in environmental education, which is so badly needed throughout the SAVA region. We were received with warm enthusiasm at Macolline (double and triple cheek kisses galore!), and Marie Helene soon had us planting ceremonial trees, touring her new environmental interpretive center, and walking around in her forest of planted native trees. We look forward to future collaborations with Marie Helene!

In typical Malagasy VIP fashion, as we visited Macolline, our baggage, airline tickets, and passports were whisked away to the airport ahead of us, so that we could prolong our stay in the gardens. We arrived at the airport to checked baggage, freshly issued boarding passes, and, thankfully, our passports! We boarded the 15 seater Twin Otter aircraft and were on our way back to Tana. The flight went as smoothly as such a small plane can travel – perhaps thanks to the woman in the front row who had her hands clasped in prayer, with eyes cast skyward, for the entire flight.

Visiting both Ivoloïna, and especially our SAVA project, were very important for Anne, as DLC director. No matter how many photos you see, or descriptions you read, there is absolutely no substitute for seeing it in person. Erik, Lanto and I certainly enjoyed showing off the various project activities. Karl Bates will be writing articles about the DLC’s conservation efforts in Madagascar, for both Duke Magazine, and other publications, so keep an eye out for alerts about those upcoming articles!



# Save the Date

## TRAVEL TO MADAGASCAR WITH AN EXPERT!

Duke Alumni Travel and Education has just announced they will be organizing a tour of Madagascar for 11 - 25 October, 2014. The tour will be led by DLC Conservation Coordinator and Madagascar specialist Charlie Welch. Itinerary details available soon on the Lemur Center and Duke Alumni travel websites

< <http://www.dukealumni.com/learn-travel/wildlife-madagascar-2014>>.

*NOTE: Duke Alumni tours are open to all, past attendance at Duke is not required!*

## ISLAND OF LEMURS: MADAGASCAR

Duke Lemur Center is proud to be partnering with IMAX Corporation and Warner Bros. Studios to promote the release of Island of Lemurs: Madagascar, the incredible true story of nature's greatest explorers – lemurs! Captured with IMAX® 3D cameras, the film takes audiences on a spectacular journey to the remote and wondrous world of Madagascar. Lemurs arrived there as castaways millions of years ago and evolved into hundreds of diverse species but are now highly endangered. Join trailblazing scientist Patricia Wright on her lifelong mission to help these strange and adorable creatures survive in the modern world. Narrated by Academy Award® winner Morgan Freeman, Island of Lemurs: Madagascar opens in select IMAX theatres April 4, 2014. Stay tuned for more updates!

**IMAX**  
— IS BELIEVING™ —



## LOOKING AHEAD TO BREEDING SEASON

BY ANDREA KATZ, CURATOR

As the days get shorter and the nights get cooler, our thoughts turn to the upcoming breeding season for the diurnal lemur species (except sifaka, whose breeding season has just ended). This fall-winter season, 11 breeding pairs are planned – crowned lemurs, blue-eyed black lemurs, mongoose lemurs, ringtailed lemurs and ruffed lemurs. Based on past breeding histories, we're confident that nine of these pairs will be successful and produce healthy infants in the spring, while the other two pairs (mongoose lemurs Guadalupe and Pedro and crowned lemurs Set and Ike) include aged animals that may be post-reproductive.

We carefully consider which pairs will breed in a given year. It's a nearly continuous process, based on both the DLC's animal collection plan and research needs, as well as the needs of the entire U.S. population for each species. The overriding goal is the same – to contribute to the survival of lemurs through captive management that promotes healthy, genetically diverse populations that are sustainable for lemur generations to come.

We can't breed every lemur every year. Currently we have nearly 50 potentially reproductive females in the diurnal lemurs, and about another 40 in the nocturnal species. If every female gave birth annually, the DLC colony would double from its current 260 animals to about 500 animals in two quick years! Definitely not sustainable in terms of housing, staff or our operating budget, as we strive to provide the best possible care to every animal in our charge. Nor is there enough quality space in all U.S.



zoos combined to maintain lemur population sizes on this scale.

So how do we decide which pairs will breed and which females will be on contraception? We work closely with the national Species Survival Programs and other managed programs of the Association of Zoos & Aquariums (AZA), to evaluate each previous year's breeding success across all participating institutions. Target population sizes are established based on space and resources; these are re-evaluated every five years through a comprehensive survey. Then we determine how many pairs should breed, to achieve or maintain the target population size for each species. Best pairings are determined for demographics and to maximize genetic diversity, leading to recommendations for transfers between institutions to establish new breeding pairs. Additional factors such as an institution's husbandry experience and success in breeding and birth management are also considered. And as you might expect, the DLC gets more breeding recommendations, and produces more lemur infants, than any other institution in the U.S. So here's to another fall breeding season, and all those infants to come in the spring!

fat tailed dwarf: 3 (3.0)  
crowned lemurs: 3 (2.1)  
blue eyed lemurs: 3 (2.1)  
ring-tailed lemurs: 4 (2.2)  
mouse lemurs: 5 (2.3)  
sifaka: 3 (2.1)  
black and white ruffed: 4 (3.1)

**TOTAL INFANTS  
2013 birth season: 25**

birds



# WHAT'S A LEMUR BABY WEIGH?

BY SARAH ZEHR, DLC DATA MANAGER

With the recent spate of spring births, I thought it was time to calculate the average birth weight for each of the DLC's 11 breeding species so that we can better monitor the little guys when they're born. Being science-minded out here, we track weight in grams rather than pounds or ounces. But I realize that most of you are American-minded and therefore think in pounds or ounces rather than grams. So I thought I'd give you an idea of the infant sizes by comparing them to a few everyday objects that weigh roughly the same amount.



Infants pictured are as follows: 1) Fat-tailed dwarf lemur. 2) Aye-aye. 3) Mouse lemur. 4) Mongoose lemur. 5) Ring-tailed lemur. 6) Pygmy slow loris. 7) Blue-eyed black lemur. 8) Black and white ruffed lemur. 9) Coquerel's sifaka. 10) Crowned lemur. 11) Red-ruffed lemur.

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# DUKE LEMUR CENTER TEAMS WITH "MISTER LEMUR" AUTHOR TO RAISE MONEY FOR SAVA

BY HANS HARTVICKSON

During the week of October 14-21, the publisher of the award-winning "Mister Lemur" books will donate \$5 for each book sold on [www.lemurstore.com](http://www.lemurstore.com) to the Duke Lemur Center's SAVA conservation project. This money will help fund SAVA's silky sifaka conservation efforts in and around Marojejy National Park.

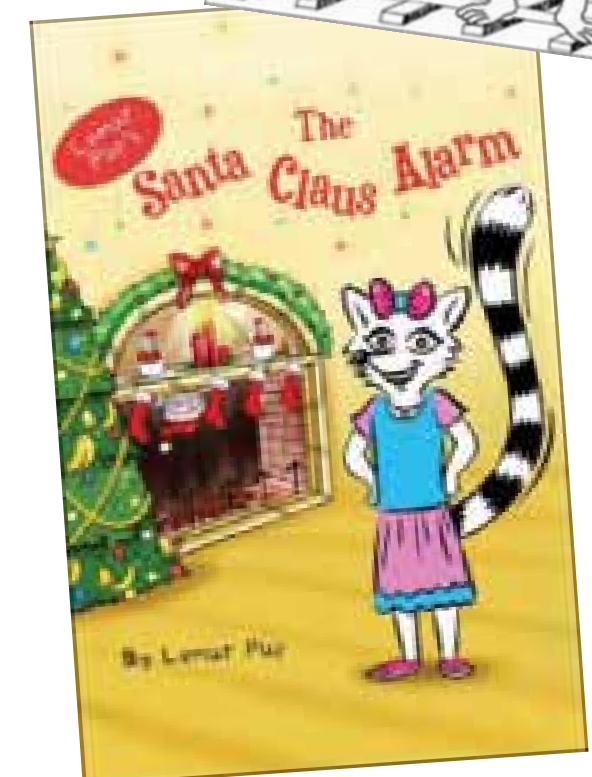
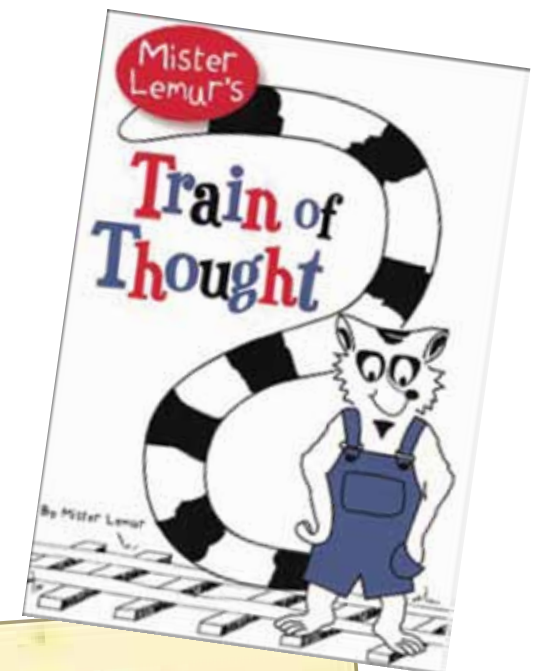
Mister Lemur stories combine concepts from science, math and geography in a fun, rhyming context. They are written by Stanford-educated authors Hans and Jen Hartvickson, who fell in love with lemurs while on a 2006 trip to Madagascar. Hans and Jen now travel the country full-time getting elementary students excited about reading, writing and lemurs!

\* "Mister Lemur's Train of Thought", a 151-page collection of Shel Silverstein-esque rhymes, won the gold medal for children's poetry in the 2011 Moonbeam Awards. It is ideal for grades two through five.

\* "It Will Take a Lot of Us to Lift a Hippopotamus" features Mister Lemur, Silky and their friends learning a humorous lesson about teamwork while trying to rescue a hippo on a safari. Well-suited to students in grade two and below.

\* Get a jump on your Christmas shopping with "The Santa Claus Alarm", by Mister Lemur's little sister. The book features an adorable female hero in her quest to finally meet Santa Claus. Along the way, she learns that giving can be just as rewarding as receiving. For grades two and below.

You can learn more about each of these books, and support silky sifaka conservation, by visiting [www.lemurstore.com](http://www.lemurstore.com) by October 21, 2013.





# IT'S A RUFFED LIFE: A TALE OF TWO VARECIA GROUPS

BY DAVID HARING, REGISTRAR/PHOTOGRAPHER

I hate to anthropomorphize when it comes to our lemurs, but sometimes it's hard not to do so when comparing the fortunes of some of our larger social groups. Just like human families, some lemur social groups seem to thrive and prosper, while others just can't seem to catch a break, and slowly decline and fade away. Consider the black and white ruffed lemur group led by Kizzy (free ranging in NHE 6) compared to Carina's red ruffed lemur group (free ranging in NHE 4). There are a lot of similarities between the groups: not only had the Ruffed Lemur SSP given recommendations recently for the adult pairs in each group to breed, but both groups also suffered the recent loss of their breeding males. Kizzy's mate, the legendary Amor, died 17 May 2013 at the ripe old age of 32. Carina's mate, the respected and admired Alphard, died in March, 2013 at the age of 24. Strangely enough, both males were well into adulthood before they produced their first offspring. The first of Alphard's five offspring (all with Carina) was born in 2008, and Amor's first of eight infants (all with Kizzy) was born in May, 2009.

In May, 2011 Carina's group was perhaps at its peak: Carina had just given birth to twin females Cordelia and Pandora, in the triplex, while Alphard and his subadult offspring (male Avior and females Hydra and Lyra) continued to free-range in the huge 14 acres of mature woodlands that comprise NHE 4. The goal was to introduce Carina and her infants to the free-rangers, and to have the spectacular group of seven free-ranging by summer, but this never came to pass. Oddly, Avior started to act aggressively towards his sisters (usually it is the females, even if they

are just juveniles, beating up on the males). Since the SSP had breeding plans for the girls, they were removed from the group in June, 2011 and soon afterwards shipped to zoos in Kansas City and Nashville. Carina and the twins were reintroduced to Alphard and Avior and the still formidable group of five ruffed lemurs, free-ranged that summer and the summer of 2012. But then in January, 2013, disaster struck: Alphard was discovered lying on his side, barely able to move. Diagnosed with pancreatic cancer, the Vets immediately grounded him from free-ranging to preserve his strength. At first he was housed in a single cage alongside his family, but interactions with the group through the cage wire proved to be stressful to the old man, so he was pulled and moved to the D wing where he could live out his days in peace. His health continued to decline and he died in March, 2013.

After the death of their patriarch, Carina's group luck continued to decline. One glorious April day this spring, technicians grew concerned when Cordelia did not show up at feeding time. A search party finally located her close to the top of mature loblolly pine, barely visible ( she was at least 80 feet above the ground!). Concern mounted over the next two days when Cordelia refused to budge an inch. In the decades that lemurs have free-ranged at the DLC, this particular predicament had never occurred: a forest dwelling lemur getting stuck in (or for some reason refusing to descend) a tree! There were

basically two possibilities: she had a serious injury that prevented her from climbing down, or she was seriously ill. Finally, 72 hours after she was first reported missing, the DLC enlisted the climbing skills of a local tree service, and, as a large contingent of the staff watched breathlessly, a heroic tree climber (our hero for the day!) climbed the 80 feet to where Cordelia was resting, and gathered what appeared to be an exceptionally grateful lemur into his arms, and, without a sign of protest from the lemur (in fact she started licking the sweat off his neck half way down!), carried her gently to the ground. Cordelia was rushed to the Vet office and although she was dehydrated, and diagnosed with a severe case of vestibular syndrome (which made her very dizzy and unable to climb), she was surprisingly strong, and in a few days was well on her way to recovery--although she still had a bit of a lingering head tilt, and her free-ranging days with the group were definitely over.

Now Carina's group had dwindled to three: Carina, Avior and Pandora, yet still their ill fortunes continued! Just over a month after Cordelia's illness, her big brother Avior decided he was going to go on a Walkabout. We are not sure how he escaped from NHE 4, but early on a Friday morning before the Memorial Day weekend, a passing motorist saw him dashing across Cornwallis Road, a quarter mile from the Lemur Center, and, thankfully, reported the lemur sighting to the local authorities. Alerted, the Lemur Center staff sprang



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## DLC RESEARCH BY THE NUMBERS

\*July 2012-June 2013

	# researchers	# projects
Faculty/Professionals/PostDocs	28	28
Graduate Students	23	23
Undergraduate Students	9	9
University classes (n=11)	102	unk
High School Students	2	2
Research Assistants	19	-
DLC Research Interns	18	15
DLC Work Study Students	5	1
TOTAL	206	78



It’s a strange but true phenomenon. All too often we overlook wonderful resources that are in our own communities, and I believe that one of those resources is the Duke Lemur Center. As a language arts teacher, I’ve planned field trips for my students to visit Duke Lemur Center for the past 17 years. I’ve watched as new buildings have been constructed, animals have been added or (sadly) lost, and I’ve seen new tour ideas develop and grow. I’ve always been in awe of the rich resource that is the Lemur Center. As research is an important part of the 7th grade Language Arts curriculum, my students each select a lemur to research and write about. After completing this task, they then create 3-D models of their particular lemur, and the unit culminates with a visit to the Duke Lemur Center. The tour provides students with a deeper understanding of lemurs and their plight, but it also makes them aware of how lucky they are to have the Lemur Center close by. After all, where else besides Madagascar can you go in this world to see such a collection of rare and precious lemurs? What other groups are working so pointedly with Madagascar to aid and protect these endangered or vulnerable creatures? It has been my pleasure to introduce seventh graders each year to the invaluable resource that is the Duke Lemur Center.

Carol C. Brown,  
NBCT, Language Arts  
Leesville Road Middle School

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# Thank You

into action: armed with nets, radio tracking receivers and raisins, a large percentage of the technical staff set out to comb the vast swampy, wilderness-like section of Duke Forest near the point where Avior was seen crossing the road. We’re not sure what he was up to: was he headed to the beach for the holiday weekend, or in search of another group of ruffed lemurs to join? A morning of searching through the forest resulted only in tick bites too numerous to count, soggy feet, and the arrival of a local TV station eager to report the latest news on the escaped lemur. After a break for water and a change into dry footwear, a revised search strategy was planned. Just as the Lemur Center search party of around a dozen intrepid technicians was about to return to the forest, the very best news possible was announced: an observant and lemur-savvy resident of the nearby Loch Nora neighborhood had spotted Avior venturing into his garage (perhaps searching for where the monkey chow was stored?), and this man (our hero for the day!) closed the garage door thus trapping the lemur, and immediately called the Center.

Less than an hour later, Avior was safe and sound in the Vet exam room (the Vets declared him completely unharmed), savoring some bananas and monkey chow and perhaps wondering what the heck he had been thinking. Needless to say, his free-ranging days were over. From then on until this day, the once proud group sits somewhat forlornly (or is that just my imagination?) in their two triplex cages: the never-to-free-range-again Avior and Cordelia on one side, and Carina and Pandora

on the other. When the new NHE 4 fence is finally in place, Carina and Pandora might free-range for the remainder of the warm season, but that’s probably it for their free-range days. Most likely Carina will not be recommended for further breeding, so it is likely that the group of two will be replaced in NHE 4 by a more vibrant, and dare I say it, successful group of ruffed lemurs, and Carina will have to live out her days in a conventional indoor/outdoor cage. Sad, but what can you say, it’s a jungle out here!

Meanwhile, on the other side of the Lemur Center, the saga of Kizzy’s group since the death of Amor, has been anything but tragic. Five days before Amor died on May 17th, Kizzy gave birth to strapping twin boys, Rees and Amor Jr. The day before the births, Amor had been free-ranging in the beautiful peak of springtime forest (Kizzy was kept in the building pre-delivery) with his sons Albert and Saunders (twins born June, 2011), Magellan (born May, 2010) and Eros Jr (born May 2009). I won’t go so far as to say Amor died surrounded by his family (neither juvenile male nor female ruffed lemur offspring are particularly nice to their sires), but certainly his life just before death was a lot more pleasant than that of poor Alphard’s.

A month or so after giving birth, Kizzy and her infants were gradually introduced to the four young boys, and everyone has been getting along great since then (with absolutely zero drama: no walkabouts, no bouts of paralysis in the tree tops!). Just in the last few weeks Rees and Amor Jr. have ventured out into the wilds of NHE 6 from the safety of Ata Aly for the first time, and although the young twins are not yet comfortable in the forest, you can see it is just a matter of time before both are traveling through the trees in that form of locomotion unique to ruffed lemurs: a reckless, mad dash down a horizontal limb, followed by a wild and blind launch



into space, ending with a crash landing into a slender branch of the neighboring tree, all in a fashion that would surely make their old man smile. Or at least the ruffed lemur equivalent of a smile: a brief mob call perhaps?

On a somewhat somber note I just have to add that this is probably the peak for Kizzy’s group, at least in terms of numbers of animals. Curator Andrea Katz has wisely deciding that the group (now six males and Kizzy) is getting too big to remain stable for long (part of the reason they have stayed together so long is surely due to the preponderance of male offspring, females just tend to cause more trouble). In addition, consideration must be given to the fact that all are valuable to the SSP. So Albert and Saunders will be removed from the group this fall and shipped to the Point Defiance Zoo in Washington State to set up a new breeding group. Kizzy is also not recommended to breed this year. But not to worry! This doesn’t mean that Kizzy’s group will wind up like Carina’s! Certainly Kizzy, Amor Jr, Rees , Magellan and Eros Jr. will continue to captivate and entertain all those fortunate enough to see them in the forests of NHE 6 (right by the Lemur Center’s main parking lot as you arrive for tours ) for years to come!



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