

# Proceedings of the 44th Annual National Conference of the American Association of Zoo Keepers, Inc.



**August 27<sup>th</sup> – 31<sup>st</sup>**

**Posters**



# Table of Contents

## Conference Posters

Click on the Title to View the Poster

### **Spot Our Artists: Giraffes Painting for Conservation**

Traci Backus, Lion Country Safari

### **Dieting and Reproductive Success of an Obese Male Brown Kiwi**

Wesley Bailey, Smithsonian Conservation Biology Institute

### **Voluntary radiographs in an adult female Bornean orangutan: fabrication, training, and teamwork**

Amanda Bania, Becky Malinsky, Dr. Katharine Hope, and Matt Hancock, Smithsonian's National Zoo

### **Successful Breeding of Dalmatian Pelicans, *Pelecanus crispus*, at the Phoenix Zoo**

Marisa Boyd, Bryan MacAulay, Phoenix Zoo

### **Tree Kangaroo (*Dendrolagus ssp*) Captive Diet Survey and Reformulation**

Beth Carlyle-Askew and Deanna DeBo, Woodland Park Zoo

### **Training in 30 Days or Less: A Quarantine Point of View**

Mallory Carmean, CVT; Carol Fieseler; Kim Olson, RVT; Chris Hanley, DVM, Dipl ACZM, St. Louis Zoo

### **Saving Ourselves to Save Species - Zoo Keeper Health and Fitness**

Robin Chambers, Pittsburgh Zoo & PPG Aquarium

### **Busy Elephants: Using innovative ideas when enriching 0.6 African elephants**

Kelsey Chmill, Cheyenne Mountain Zoo

### **We Heart Orangutans: Cameron Park Zoo's Cardio Health Program**

Theresa Clyatt-Larson, Cameron Park Zoo

### **Managing a Breeding Colony of Pink-backed Pelicans *Pelecanus Rufescens* in a Mixed Species Exhibit**

Brandy Coffin, Disney's Animal Kingdom

**Use of herbal supplements to decrease anxiety in an adult female chimpanzee (*Pan troglodytes*)**

Erin Dombroski, Maryland Zoo

**Somebody's watching you: A cost effective method of unobtrusive animal observations**

Jennifer Holmes, Disney's Animal Kingdom

**Acclimating Red Pandas to their New Exhibit**

Patricia Jarvis, Smithsonian's National Zoo

**Comparing Large Cat Growth Rates: A Case Study at the Smithsonian's National Zoological Park**

Kathryn Juliano, Smithsonian's National Zoo

**Comparison of Substrate Changes with Caribbean Flamingo Foot Conditions**

Joy Kotheimer, Columbus Zoo & Aquarium

**Look Out! It's A Thor-nado!: Target Training to Reduce Aggression in 1.0 Navajo Churro Sheep**

Kimberly Kruse, Stephanie Sanchez, Arizona Center for Nature Conservation (The Phoenix Zoo)

**Stepping Inside the Box: Creating a Nyala Interaction Area**

Christy Layton, Busch Gardens Tampa Bay

**Bei Bei's Bamboo Bezoar**

Nicole MacCorkle, Laurie Thompson, Smithsonian's National Zoo

**Training 4.0.0 Miniature Mediterranean Donkeys for Medical Behaviors and Visitor Demonstrations**

Nikki Maticic, Smithsonian's National Zoo

**Cross-fostering Captive Born Mexican Wolf Puppies into a Wild Den**

Tracy Rein, Emma Miller, Regina Mossotti, Endangered Wolf Center

**Creating professional development opportunities for keepers at small, rural facilities**

Ruth Steel Mock, Sequoia Park Zoo

**AAZK Grants Committee**

Amanda Ott, AAZK's Grant's Committee

**Tiger Talk – Utilizing Common Communication Signals to Identify Estrous in A Sumatran Tiger (*Panthera tigris sumatrae*)**

Leigh Pitsko, Smithsonian's National Zoo

**Nesting Behavior in Zoo-Housed Orangutans**

Alexandra J. Reddy, Meredith L. Bastian, Smithsonian's National Zoo

**Modern Conservation: The Red Siskin Initiative**

Erica Royer, Smithsonian's Conservation Biology Institute

**PSLs for PSLs: Slow Loris Conservation through Collaboration and Coffee**

Sean Salinger, Moody Gardens

**International Outreach Committee Furthering Professional Education and Relationships Abroad**

Noah Shields, AAZK's International Outreach Committee

**"The Wall" Bamboo Enrichment for the Hyacinth Macaw**

Rick Smith, St. Louis Zoo



# Spot Our Artists: Giraffes Painting for Conservation

Traci Backus, Lion Country Safari



## INTRODUCTION

At Lion Country Safari in Loxahatchee, FL, conservation, education and animal welfare are among our top priorities. A new giraffe painting program helps us improve these efforts. This program utilizes the talents of our training staff and four of our resident giraffes (*Giraffa camelopardalis*). Each painting sold directly benefits the Giraffe Conservation Foundation.

Besides benefitting their wild counterparts, the painting sessions provide mental and physical stimulation for the giraffes involved. Each giraffe is taught to hold a paintbrush in his mouth and touch the paintbrush to a canvas. We encourage each giraffe to paint in his unique style.

Guests may purchase paintings at our Giraffe Encounter, and they may even get to see a giraffe working on his art! We also offer Giraffe Painting Experiences for guests to choose their own colors of paint, learn about giraffe conservation and witness their custom artwork being made.

The training process we used to get the giraffes to paint with a paintbrush has been successful in that we are able to easily produce paintings for sale, enrich the lives of our giraffes and also delight guests and raise money for conservation.



## MATERIALS

Paintbrush adapted for use by a giraffe, easel, clip to hold the canvas to the easel, cloth for covering the workspace, treat pouch, reinforcement, paint tray, non-toxic acrylic paint, water to dilute the paint, canvas (we use 16"X20" 5/8" deep stretched canvases)

Tip: We use sweet potato slices and sometimes bananas as reinforcement for painting.



Bahkari

## INTRODUCING THE PAINTBRUSH

Goal: The giraffe takes the paintbrush handle into his mouth while the trainer is also holding the handle. The trainer bridges, then removes the brush before reinforcing.

Criteria: The giraffe should not try to steal or eat the paintbrush.

Tip: It is best to always point the bristles the same direction to keep the training consistent.



Bahkari

## HOLDING THE PAINTBRUSH

Goal: The trainer hands the brush to the giraffe and the giraffe holds the paintbrush still in its mouth for 5 to 10 seconds without any aid from the trainer, then the trainer removes the paintbrush from the giraffe's mouth and reinforces.

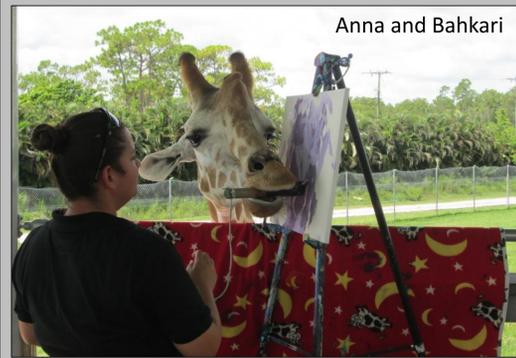
Criteria: To keep paint out of the giraffe's mouth, the paintbrush should be still inside the giraffe's mouth; no slipping sideways or spinning. The trainer should be able to take the paintbrush before the giraffe drops it.

## INTRODUCING THE CANVAS AND EASEL

Goal: The giraffe is desensitized to the presence of a canvas and easel near its face. (This training should be separate from the paintbrush sessions until both goals are completed.)

Criteria: The canvas should be close to the giraffe's face but the face should not touch the canvas. Teaching the giraffe to touch his face to the canvas will cause problems later when you're using paint.

Tip: You can also use these sessions to desensitize the giraffe to the other painting supplies, such as the drop cloth.



Anna and Bahkari

## LEARNING TO PAINT

Goal: The giraffe will place the paintbrush against the canvas and then move it away from the canvas before the trainer takes the paintbrush and reinforces.

Criteria: The giraffe does not paint hard enough to move the canvas and easel. The giraffe does not drop the paintbrush. The giraffe should not touch his face to the canvas. The paintbrush bristles should only touch the canvas.

Tip: When reinforcing the giraffe for giving you the brush, reinforce the giraffe away from the canvas so he learns to keep his face from touching the canvas.



Mosi



Traci and Bobby

## PAINTING

Goal: The trainer applies non-toxic paint to the paintbrush, hands the paintbrush to the giraffe and the giraffe touches the paintbrush to the canvas. Then the giraffe moves the paintbrush away from the canvas. The trainer takes the paintbrush from the giraffe and reinforces the giraffe.

Criteria: A painting is created and there is no paint on you or your giraffe at the end of the session!

Tips: Once you've mastered this step, you can use shaping to get different paintbrush strokes. Initially, refrain from using red paint to avoid others from thinking you have a "bloody giraffe".



Kim and Manowari

## TARGET PAINTING

Goal: The giraffe creates different designs and shapes, letters or numbers.

Criteria: While holding the paintbrush, the giraffe follows the target (trainer's hand) with his nose so the trainer controls where the paintbrush touches the canvas.

## CONSERVATION

Lion Country Safari's giraffe painting program directly benefits the Giraffe Conservation Foundation.



Half of the price of each painting sold and \$50 from each Giraffe Painting Encounter is donated to GCF.

Between January 2016 and June 21, 2017 (**World Giraffe Day**), LCS has raised \$4,339 for the Giraffe Conservation Foundation through the sale of paintings and Giraffe Painting Encounters.



Manowari

## ACKNOWLEDGEMENTS

I would like to thank Kim Wuenstel, Anna Samaroo, Sami Cowan and Lisa Flood for their commitment to Lion Country Safari's giraffe painting program and giraffe conservation.

All photos are credited to the LCS training staff.

## CONTACT INFORMATION

Traci Backus, Wildlife Trainer  
Lion Country Safari  
(561) 793-1084 ext. 2341  
traci.backus@lioncountry safari.com



# Obesity, Dieting, and Reproductive Success In the Male Brown Kiwi

Wesley C. Bailey

Smithsonian Conservation Biology Institute, Front Royal, VA 22630

## Obesity and Dieting

- SCBI received brown kiwi from New Zealand in 2010.
- Kiwi are endangered and have a small population outside of New Zealand. Part of a red Species Survival Plan®.
- Of the 23 eggs laid by the breeding pair before this project, only one had been fertile.
- PVM sperm detection found no sperm in an egg.
- Obesity was postulated to be a determining factor for the observed infertility, as the male has been chronically obese since arrival at the facility.
- The male will consume the females food. Additionally, can forage outside for natural fauna.



## Demonstration of Efficacy

- Females have longer bills than males, so exclusion feeder simple in design.
- Tubes were placed in pieces of wood into which part of the diet was placed. The tubes were 1" schedule 40 PVC conduit cut to 140 mm in length.
- Diet adjustments for the male were based on his weight, enclosure access, and the temperature outside.
- All eggs laid while the male was at or under 2.69 kg were fertile. Removing the 2.69 outlier egg in 2010, for which the data is incomplete, all eggs laid while the male was at or under 2.527 kg were fertile.

## Weight Goals

- Wild kiwi weights
- Previous weights with fertile eggs
- Animal health
- Current weight and weight trend

## Program Evaluation

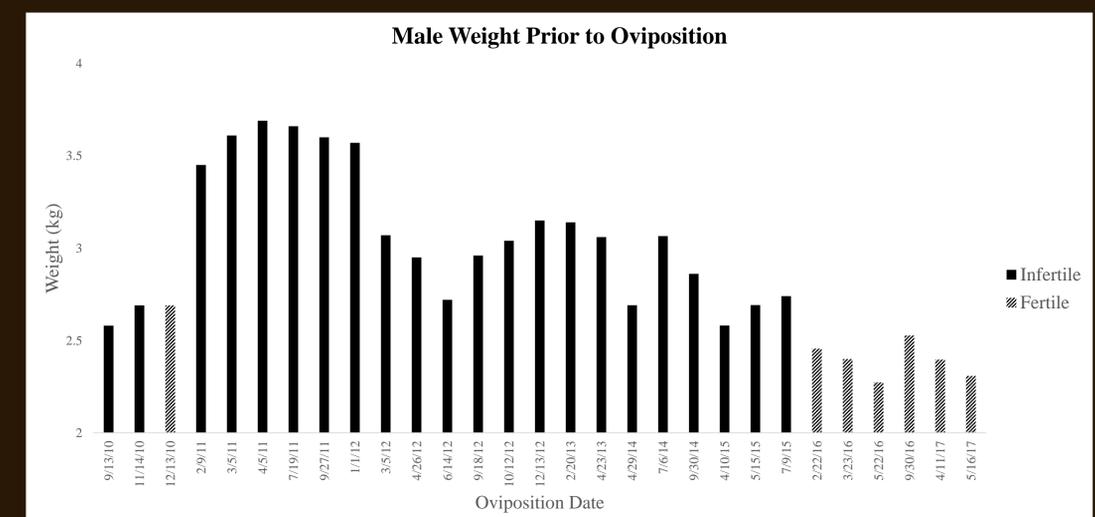
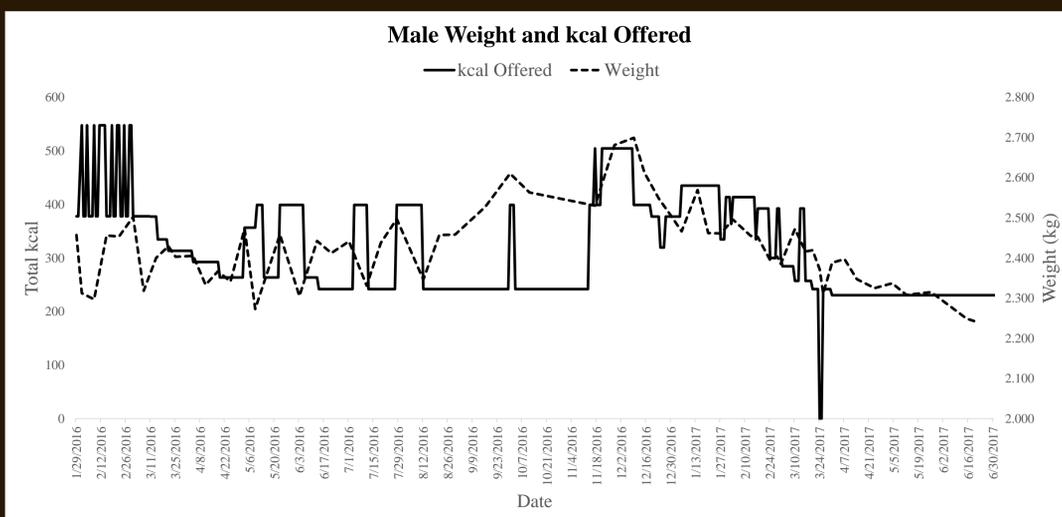
- Assess weight trend
- Determine fertility
- Evaluate diet adjustment success
- Monitor individual health

## Daily Maintenance

- Observations
- Weekly weights
- Enclosure access
- Diet adjustments

## Egg Laid

- Weight on 1.1
- Give dummy to 1.0 for test incubation



# Voluntary radiographs in an adult female Bornean orangutan: fabrication, training, and teamwork

Amanda Bania, Becky Malinsky, Dr. Katharine Hope & Matt Hancock  
Smithsonian's National Zoological Park, Washington, DC



## The Background

- Female orangutan, Batang, has a history of mild air sacculitis which escalated in late 2015
- In 2106, Batang became pregnant and gave birth to her first offspring
- In order to monitor her condition without requiring anesthesia and separation from her infant, a staff veterinarian requested the ability to obtain chest radiograph images

## The Challenge

- Creating a setup that was functional, low cost, and required minimal facility modifications
- Setup design had to keep orangutans, keepers, vet staff, and a very expensive x-ray plate safe
- While Batang's motivation for training is high, keepers had to troubleshoot her physical positioning through trial-and-error as well as mitigating her tendency for destructive behavior

## Design and Installation

- After much brainstorming, the final design utilized existing parallel transfer chutes and the addition of a custom sliding door on an overhead track and bracketing system to hold x-ray plate
- Zoo maintenance staff was invaluable in assisting with logistics, fabrication and installation of new training equipment
- Preliminary tests were done by veterinary staff to ensure that the portable radiograph could shoot images through an acrylic door
- Later addition of metal hand-holds to aid with positioning

## Training and Outcome

- Batang's trainers were able to teach this new behavior in a step-wise process using positive reinforcement techniques
- The overall time to complete training Batang for voluntary radiographs was 3 months (approximately 25 sessions)
- Began with positional training; orienting away from keepers was initially challenging – hand cues, laser pointer, visual/physical aid for proper hand placement
- Then familiarized her with new sliding door and faux x-ray plate
- Desensitized her to radiograph equipment and additional keeper and veterinary staff
- Putting it all together – team successfully shot voluntary radiographs with Batang in March and June 2017!



Custom sliding door design



Veterinary staff setting up



Trainer 'A' positioning in chute



Trainer 'B' cueing in yard

# SUCCESSFUL BREEDING OF DALMATIAN PELICANS (*Pelecanus crispus*) AT THE PHOENIX ZOO

Marisa Boyd<sup>1</sup> & Bryan MacAulay<sup>1</sup>

<sup>1</sup>ARIZONA CENTER *for* NATURE CONSERVATION

## INTRODUCTION

Dalmatian pelicans are the largest species of pelicans and are listed as 'Vulnerable' on the IUCN red list. San Diego Global was the first institution in the US to establish a breeding population of Dalmatian pelicans. In an attempt to develop a second breeding population, a flock was established at the Phoenix Zoo in 2011. In 2015, a subset of Dalmatian pelicans (n=6) were recommended for breeding and were relocated to a lake with a reproductively active flock of Pink-backed pelicans (n=9). The increased flock size and exposure to breeding pelicans were insufficient to initiate breeding in Dalmatian pelicans. In 2016, a comprehensive breeding plan was developed to successfully induce breeding in a small Dalmatian pelican flock.

## METHOD

A comprehensive breeding plan was developed in 2016 to provide the Dalmatian pelicans with an optimal breeding environment that addressed multiple breeding stimuli simultaneously. Four primary factors were addressed:

- 1) **FLOCK SIZE:** Promote breeding conditions by simulating larger flock size with the addition of Pink-backed pelicans
- 2) **BREEDING LOCATION:** Encourage breeding through the relocation of a breeding raft to a safe and protected location
- 3) **NESTING MATERIAL :** Promote pair bonding and nest building by increasing nesting material availability
- 4) **COMPOSITION OF BREEDING COLONY:** Stimulate breeding behaviour through addition of reproductively active Pink-backed pelicans



Nesting material delivered to breeding raft - Photo by Kyle Waites

Nesting Material Distribution	
Timing	Oct-Feb (Pink-backed pelican and Dalmatian pelican breeding season)
Quantity	30cm diameter bundle
Frequency	Three times per week
Duration	Five months
Composition	Mixed sticks, Cattail ( <i>Typha</i> sp.), Bulrush ( <i>Schoenoplectus</i> sp.), and Umbrella grass ( <i>Cyperus alternifolius</i> )

Figure 1 - Nesting material details

Nesting material availability was the single factor that was never addressed in previous years. Nesting material distribution was timed to coincide with the breeding season of both species. Plants were chosen based on their similarity to those occurring in native habitats in the wild. Quantity, frequency and duration was determined by the rate of use by nesting birds (See Figure 1).

## RESULTS



Nests on breeding raft - Photo by Marisa Boyd



Female parent on nest with 1 month old chick - Photo by Kyle Waites



Two month old chick - Photo by Kyle Waites

- Initial breeding behaviours were exhibited during nesting material distribution
- Pairs were observed collecting and manipulating nesting material together
- Males displayed courtship behaviors with head bobbing and bill clapping on breeding raft
- All observed matings occurred on partially built nests on breeding raft
- Two Dalmatian pelican nests were built adjacent to three existing Pink-backed Pelican nests
- Incubating Pink-backed pelicans were retained on dummy eggs to extend their incubation period
- Both species incubated in close proximity to one another without incident
- All six Dalmatian pelicans paired off to form three pairs that resulted in 10 eggs laid
- One clutch of two eggs was fertile and both eggs hatched
- One chick survived and fledged to independence

## CONCLUSION

- Pair bonding behaviours were observed during nesting material distribution
- Males exhibited courtship displays concurrent with the start of nest building
- All observed mating occurred while female was sitting in partially constructed nests
- Nest building continued after egg laying and well into the incubation period
- Nesting material appears to be a primary contributor to initiating breeding

## ACKNOWLEDGMENTS

We would like to thank Rich Sartor for his continued support, Drew Foster for his invaluable guidance on our ongoing endeavors, Kyle Waites for the noteworthy photographs, the ACC veterinary team for their exceptional care, and the Bird team for their assistance and support.



# Tree Kangaroo (*Dendrolagus ssp*) Captive Diet Survey and Reformulation



**AUTHORS:**  
**Beth Carlyle-Askew**  
*beth.carlyle-askew@zoo.org*  
 AND  
**Deanna DeBo**  
*deanna.debo@zoo.org*

- The Tree Kangaroo Species Survival Plan (TK-SSP) conducted a survey in 2015 to obtain information on current Matschie's Tree Kangaroo (*Dendrolagus matschiei*) captive diets.
- In 2016, the TK-SSP expanded the survey internationally to include similar species such as the Goodfellow's Tree Kangaroo (*Dendrolagus goodfellowi*).
- In collaboration with the Tree Kangaroo Conservation Program (TKCP) food plant samples from the Yopno, Uruwa, and Som (YUS) Conservation Area are being collected to help determine nutritional needs for wild tree kangaroos.
- The goal is to utilize the data to formulate a nutritionally similar formula-based diet for captive tree kangaroos.



## Collecting the information from United States and Canadian Institutions with Matschie's Tree Kangaroos

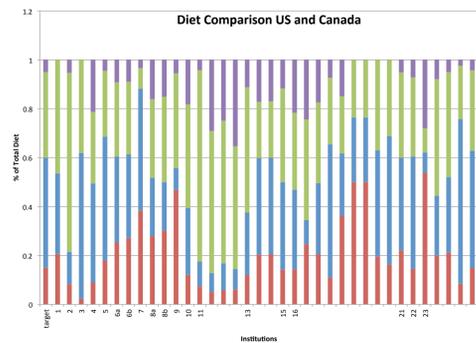
- Institutions sent a copy of their diets to the TK-SSP
- The diets were in a wide range of details in a variety of formats
- Clarifying emails were sent and answered

## Challenges in the US and Canada

- Diet items were in number of items rather than by weight
- If by weight often in ounces rather than grams
- Multiple diets per institution (maintenance diet, weight loss diet, joey diet)



- Number of feedings per day - 1 feeding per day up to and including 3 or more
- Some fed the same diet daily and some had a different diet for each day
- There were specific diet items (kale) versus more general (4 types of greens)
- Determining the brand – "Leafeater Biscuits" on many diets could mean 5 different things

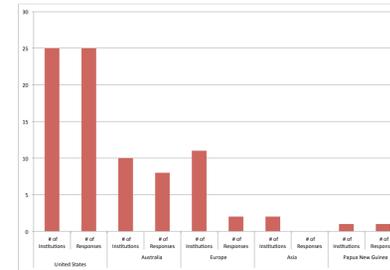
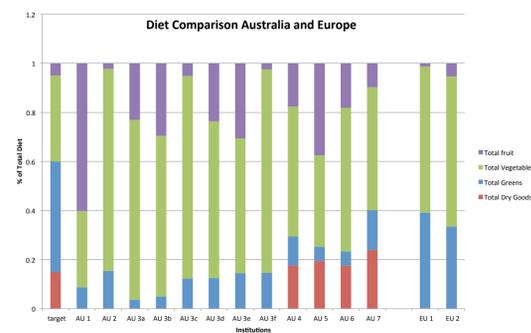


### LEAFEATER BISCUITS:

Company	Name	Size	Item #	Protein	Fiber	Fat
Mazuri	Primate Biscuit	5M02	23%	14%	5%	
Mazuri	Primate Mini	5672	23%	14%	5%	
Marion	Leaf Eater	Gorilla LEG B25	23%	10%	6.5%	
Marion	Leaf Eater	Lemur LEL B25	23%	10%	6.5%	
HMS	High Fiber	Primate	22%	18%	7%	

## Collecting the information from international institutions with Goodfellow's, Lumholtz, and Matschie's Tree Kangaroos

- Same process for collecting information and comparing the results



## Challenges Internationally

- Communication has been more difficult with multiple languages
- Used internet to determine what an item is named in English (i.e. silverbeet = swiss chard)
  - The majority of the diet is browse when the animal is in its native country
  - The institution receives donated food which can impact the diet from day to day
  - Convincing keeper staff to feed the correct diet when it is much better than what they have to eat



## Partnership with TKCP

- This fall in Papua New Guinea, Dr. Lisa Dabek and her team with the Tree Kangaroo Conservation Program will collect food plants for analyses from the YUS conservation area in Papua New Guinea



## How to compare

Used the total daily amount

- Not impacted by how many feedings a day
- Didn't matter what was fed when

Then added daily amount into a weekly totals

- Many diets had at one or two items that varied during the week
- Some had a slightly different diet every day
- Only one or two had rotational items less frequently (monthly)

Determined categories vs tracking every item individually

- Dry Goods, Greens, Vegetables (non-root), Vegetables (root), Fruits
- i.e. endive, romaine, and spinach all combined as greens

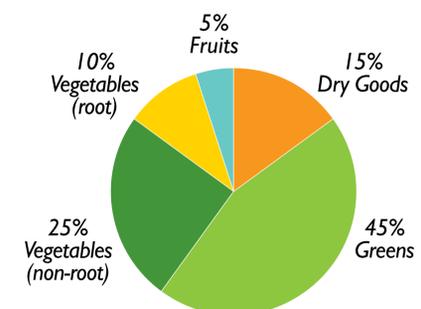
Food Item	Huen	Elanna	Days
1. Mazuri Leafeater biscuits	35 g	35 g	SMTWRFS
2. Romaine	100 g	100 g	SMTWRFS
3. Swiss Chard	100 g	100 g	SMTWRFS
4. Bok Choy	50 g	50 g	SMTWRFS
5. Spinach	50 g	50 g	S R
6. Rotational Greens	50 g	50 g	T S
7. Celery (3"-4" spears)	30 g	30 g	SMTWRFS
8. Banana (whole chunk, w/ peel)	10 g	10 g	SMTWRFS
9. Carrots (1/2"x1/2" spears)	30 g	30 g	SMTWRFS
10. Yam (1/2"x1/2" spears)	10 g	10 g	SMTWRFS
11. Corn cob	20 g	20 g	SMTWRFS
12. Hard boiled egg	1 egg	1 egg	W

Woodland Park	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Weekly
Dry Goods								0 grams
AGP 35								0 grams
Blue Seal Corns 14								0 grams
High fiber primate diet								0 grams
Kangaroo Chew Pellets								0 grams
Low fiber herbivore								0 grams
Mazuri Leafeater	35	35	35	35	35	35	35	245 grams
Mazuri Leafeater								0 grams
Primate Pro-Biscuit								0 grams
Total dry goods	35	35	35	35	35	35	35	245 grams
Fruits								0 grams
Apple								0 grams
Banana	10	10	10	10	10	10	10	70 grams
Carrot								0 grams
Grapes								0 grams
Orange								0 grams
Pear								0 grams
Mango								0 grams
Melon								0 grams
Strawberry								0 grams
Rotational/Seasonal								0 grams
Mixed Fruit								0 grams
Total Fruit	10	10	10	10	10	10	10	70 grams
Vegetables - non root								0 grams
Broccoli								0 grams
Corn cob	20	20	20	20	20	20	20	140 grams
Celery	30	30	30	30	30	30	30	210 grams
Carrot								0 grams
Green Beans								0 grams
Spinach								0 grams
PSL								0 grams
Spinach								0 grams
Yam								0 grams
Rotational/Seasonal								0 grams
Mixed Veg								0 grams
Total non root veg	50	50	50	50	50	50	50	350 grams

## Outcomes

- There is a wide variety of items being fed
- Items fed at some institutions were restricted or not allowed at others
- At several institutions, keepers reported the submitted diet did not match what the animal was actually given
- Food items used for training are not included in the diet amounts (can increase calories)
- Browse including flowers, leaves, and bark is food but is very difficult to quantify

The SSP nutritional advisor recommends adjusting the diets to the following amounts:



## ACKNOWLEDGEMENTS

Jacque Blessington, Lisa Dabek, Kathy Russell  
 All institutions with tree kangaroos who submitted their diets  
 Participants at the 2015 Tree Kangaroo Workshop, Milwaukee  
 Australasia, Day House & Northern Trail Keeper Staff  
 Woodland Park Zoo North Team Managers



# Training in 30 Days or Less: A Quarantine Point of View

**By: Mallory Carmean, Quarantine Keeper, CVT; Carol Fieseler, Quarantine Keeper; Kim Olson, RVT  
Saint Louis Zoological Park**

The start of an animal's journey at a new zoo begins with quarantine. Animals "check in" for a 30 day stay or in the case of snakes, 90 days. During their time in quarantine, these animals will undergo a number of husbandry and medical procedures. To facilitate these procedures and make the animal's transition into and out of quarantine as smooth as possible, it has become a goal of quarantine staff, with the approval and support of animal management and veterinarians, to incorporate training into the animal's daily routine.

Scale, hand injection and crate training have proven to be the most beneficial in enhancing and accomplishing quarantine protocols and goals within the timeframe allotted.

Target training and desensitization are the most common techniques used to achieve the desired behaviors. Verbal praise, clickers and whistles are used as bridges. Favored items from the animals' diet or a portion of the entire diet are used as a reinforcer.

Due to the variety of species quarantine cares for, all with different backgrounds, a generalized training program is not always possible, and thus each case must be considered individually.

### Challenges to training in quarantine:

- Limited timeframe to accomplish training goals
- Limited timeframe to develop a relationship with animals
- Limited space available for training structures
- Limited staff available
- Time available within the day to having a training session (dependent on the current amount of animals in quarantine)

### Advantages to training in quarantine:

- Quick access to animal
- A more controlled environment
- A smaller staff for a consistent training program
- Time available within the day for a training session (dependent on the current amount of animals in quarantine)
- Not limited to training one species

### Basic Goals of Quarantine:

- Ensuring a smooth transition into and out of quarantine (from unloading at the start to being transported out of quarantine)
- Encouraging an animal to begin eating as soon as possible
- Transitioning an animal from the diet of the previous institution to the current institution (when warranted)
- Allowing animals to become accustomed to a new building, keepers and routine.
- Ensuring the animal is healthy and receives a quarantine exam
- Monitoring fecal output and collecting samples for parasitology for a total of three negative fecals
- Maintaining high standards for animal husbandry and quarantine biohazard security

### Enhanced Goals of Quarantine:

- Creating an environment that will encourage natural behaviors (through enclosure set up and enrichment)
- Training for behaviors to achieve a positive response when trying to accomplish quarantine protocols and goals

### Pre-Training Considerations:

- Animal's level of comfort with the new keepers and environment
- Training structure material and placement
- Space available for training
- Number of staff needed for the training session
- Animal security and safety when offering access to the training structure, trailer and /or crate
- Reducing or preventing animal behaviors that can lead to the destruction of training structures, crates, or trailers
- Multiple animals housed together



Figure 1. Scale training with Andean bear



Figure 10. Serval targeting in chute hand injection training



Figure 2. Cheetah hand injection training



Figure 9. Eagle Owl scale training



Figure 3. Ring-tailed lemur targeting for hand injection training



Figure 8. Andean bear targeting for hand injection training



Figure 4. Somali Wild Ass trailer training



Figure 5. Babirusa crate training

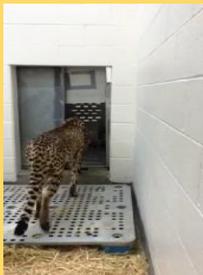


Figure 6. Cheetah crate training



Figure 7. Bush dog crate training

# Zoo Keeper Health & Fitness

## Saving Ourselves to Save Species

By Robin Chambers | Job Title here | Pittsburgh Zoo & PPG Aquarium

Zoo keepers physical and mental health are important to our abilities to help the animals we care for. We concentrate so much on providing the animals with proper nutrition, exercise, and mental stimulation. Why don't we do the same for ourselves? We should try to extend the shelf life of our physically and mentally demanding jobs by taking care of ourselves.



### The Research Subject: Me

Four years ago, I took a long hard look in the mirror after seeing recent pictures of myself. While I never considered myself overweight, these pictures were a reality check. At a foot 3 inches tall, I weighed close to 70 lbs. As someone who has been athletic all my life, I was mortified that I had let myself get out of shape, especially being a zoo keeper. The physical demands for a zoo keeper can be intense, and I am active most of the day. My body got used to the demands I put on it and my diet reflected that of someone who was always busy, and ate what was convenient. I found myself getting tired easily and experienced bad moods.

### Exercise:

Exercise is crucial. As Zoo Keepers we think because our job is physical we don't need additional exercise. Over time our bodies get used to the demands, and soon

extra weight settles in and we start becoming prone to injuries. It is the reality of our job that we cannot be Zoo Keepers for as long as we can physically do the job. It is important that we exercise on a regular basis to maintain our health. The easiest thing to do is start small and reward yourself through positive reinforcement. I started by jogging one mile once a week to a coffee shop, and walking back with a coffee. The key is to reward yourself in a healthy way.

### Diet and Nutrition:

As Zoo Keepers we strictly monitor animal's diets and nutrition. We insure they get the correct amount of nutrients, vitamins and calories. It is not unusual for us keepers eating whatever is convenient, including the food served at our facilities that is not usually the healthiest. The key to a healthy diet and weight loss is calories consumed vs. calories burned. It is easy to consume a

lot of calories, and not burn as many as we drink. The easiest way to make a difference in your nutrition is to exchange one non-healthy thing for a healthy one. The first thing I exchanged was sodas for sparkling water. Over time I made more changes, always one thing at a time. If you change too much too fast, you will resort back to old habits. You would not change your animal's diet all at once, you would change it in increments.

### Mental Health:

The Zoo Keeping profession is hard mentally as well. We have the same stress of most professions, but we also have the stress of caring for living beings, and the stress of when our animals are shipped to another facility, get sick, or worse die. These are extremely difficult things to deal with. You need to find a way to release that stress in a healthy way. It could be by talking to a therapist, a close friend, or a loved one. I turned to yoga as a source

of mental enrichment. Yoga allows me to find mental clarity through meditation and release physical tension in my body. There are many outlets for our stress and mental health.

### Conclusion:

By using Zoo Keeper techniques, we can take better care of ourselves. Operant conditioning, positive reinforcement, nutritional guidelines, and mental and physical enrichment, can improve our health, happiness, and mental wellbeing. By implementing Zoo Keeper fundamentals I lost around 40 lbs and am in the best physical and mental shape of my life. I perform my duties as a Zoo Keeper faster, better with less chance of injury and greater assurance that I will have the physical and mental health to do this job for a long time to come. Therefore I am helping save the species I care for by helping save myself. ■



# Busy Elephants: Using innovative ideas when enriching 0.6 African elephants

When enriching elephants in zoos, it can be a challenge coming up with new enrichment that can keep them busy and convey natural behaviors. It can be formidable and frustrating trying to provide enrichment that will survive the elephants' enthusiasm and keep them interested for long periods of time. At Cheyenne Mountain Zoo, we have to be innovative in the enrichment that we make for our 0.6 African elephants (*Loxodonta africana*). Below you can see how we try to take familiar items and make different, more interactive pieces that the animals can engage with.



Kimba using the "udder feeder." She maneuvers the bowling pins in a way that allows the food inside the barrel to drop to the ground.

	Lucky	Kimba	Jambo	Malaika	Missy	LowLow
8:30-	845 S,3	845 S,8	845 T	845 T	845 S	815 S
9:30-	900 S,CH	900 S,CH	930 S,CH	930 S,CH	930 S	930 S
10:30-	1045 T,5	1045 T,5,6H	1030 B	1030 B	1000 S,CH	1000 T, S,CH
11:30-	1145 S	1145 S	1100 B	1100 B	1100 B,E	1100 B,E
12:30-			1145 S,CH,CH	1145 S,CH,CH	1130 CH,CH,S	1130 CH,CH,S
1:30-						
2:30-						
3:30-						
4:30-						

GH: grass hay E: enrichment B: browse  
 OH: oat hay S: shifting SG: social grouping  
 P: puzzle feeder T: training EX: exercise

The board shows how we ensure our elephants are kept busy throughout the day. The goal for "busy elephants" is to make sure that our animals are engaged in some activity every 45 minutes. It does not matter if it is shifting into a new space, giving them enrichment, feeders/browse, or training, as long as they are doing something that is keeping them busy and exhibiting wanted, natural behaviors.



Jambo interacting with the "kerplunk barrel." Hay is placed at the very top of the barrel. In order to get to it, Jambo pulls the fire hose strips out so that the hay will drop to the bottom of the barrel.



Malaika playing with the "tire chain" and a 755-pound tire at the same time.



Malaika eating browse from the "tire hose feeder." We can put hay in the middle of the tires, place browse through it, or just give the "tire hose feeder" to the elephants to interact with.



Lucky swinging around the "tires on hose strand" in the yard. We also hang the middle tire by chain so the elephants can tug on the tires on both ends.

# We Orangutans!!



**Theresa Clyatt-Larson  
Cameron Park Zoo**

Cameron Park Zoo loves their orangutans and wants to make sure they stay healthy.. This includes their hearts! Our proactive training program allows for voluntary cardiac ultrasounds, blood draws, and blood pressure readings. We have also started to share this information with other zoos and keepers across the country.

## Cardiac Ultrasounds

Cardiac disease is the number one killer of apes in captivity. However it is different than human cardiac disease. Voluntary ultrasounds allow for images of the heart to help diagnose cardiac disease.



## Blood Pressure

We are the second institution in the country to get voluntary blood pressure readings on our orangutans using a Tough Cuff. We are the first facility to ever get a reading on a female orangutan, by creating our very own female Tough Cuff!



Male Tough Cuff

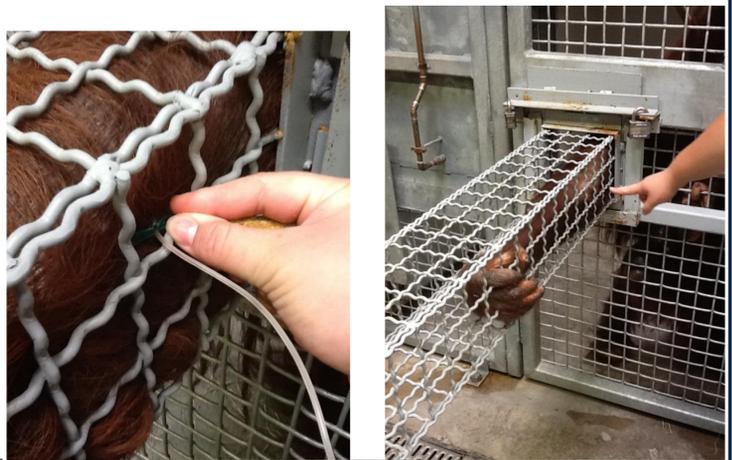
Female Tough Cuff



We are currently a pilot program for the Great Ape Heart Project - collecting both finger blood pressure and arm blood pressure readings in order to compare the two and provide more information

## Blood Draws

Having blood draw training in place is a huge asset as it can be a tool in monitoring health of apes in captive care. We were successful at collecting blood on KJ after just 3 months of training.



## Orangutan Cardiac Workshop



Hillcrest Hospital staff are at the workshop to offer information and hands on time with an ultrasound machine

Collaboration with Zoo Atlanta Keepers and Great Ape Heart Project



1<sup>st</sup> Workshop was June 2015 with 19 participants representing 10 institutions.

2<sup>nd</sup> Workshop was October 2016 with 37 participants representing 19 institutions

The day includes presentations, demonstrations with the orangutans and hands on demonstrations for the participants.

**Next Workshop Info: April 10 & 11, 2018**

# Managing a Breeding Colony of Pink-backed Pelicans *Pelecanus Rufescens* in a Mixed Species Exhibit

## Introduction

Disney's Animal Kingdom® received a founding group of wild caught pink-backed pelicans in 1998 with the intention of establishing a breeding colony. After experimenting with several different exhibits within Disney's Animal Kingdom, breeding success was found in a mixed species exhibit with Nile hippopotamus and other birds. Over the past ten years, our husbandry routine has evolved to promote the success of our breeding program.

Brandy Coffin  
Ituri Forest Animal Keeper  
Disney's Animal Kingdom®

## Challenges

- Developing an efficient and safe way to round up the pelicans for routine physicals or other management
- Native birds interfering with feeding and nesting
- Limiting hippo interaction with birds and nests
- Pelicans began breeding year round
- Managing consecutive close range clutches.



## Housing Trials

- Oct 1998- Feb 1999 1 acre habitat with a pool shared with elephants and white pelicans
- Feb 1999- Jan 2006 Housed with multiple hoofstock species, rhino, and other birds. Provided logs that were overhanging the water. Flock consisted of only pink-backed pelicans. Observed some gathering of nesting material.
- March 2006- present Hippo West River- housed with hippos and a variety of waterfowl. Naturalistic river with islands. Successful breeding!



## Reproductive Success

- March 2006- moved from rhino moat to Hippo West River
- Aug 2006- breeding plumage
- Oct 2006- nest building, copulation, eggs laid but went missing because of poor nest construction, began to pull eggs for artificial incubation
- Dec 2006- first chick hatches in incubator
- April 2007- added man-made nests to island
- Oct 2007- parent-reared chicks
- March 2008- moved eggs to other nests for fostering
- As of May 2016 we have had 58 successful pelican hatches



## Results

- Developed a routine using kayaks and sane netting to herd the pelicans into the hippo shifting corridor
- Hand feeding and routine observations to limit food stealing and egg destruction
- Provided nesting material that was not desirable to the hippos
- Dummy eggs/ nest removal to prohibit breeding
- Provided additional roosting sites on other islands for older juveniles.



# Use of herbal supplements to decrease anxiety in an adult female chimpanzee (*Pan troglodytes*)

Erin Dombroskie, Pam Carter, Ellen Bronson

## Introduction

- Maryland Zoo in Baltimore has been home to female chimpanzee “Carole” (born 6/6/1988) since 1995.
- Carole has exhibited stereotypic behaviors which could be associated with stress and may be similar to an anxiety-type disorder in humans.
  - Examples include rocking, tantrums, spitting at keeper staff, and initiating fights in the troop.
- The keeper staff have worked to reduce the stereotypic behaviors through enrichment, training, changes in routine, etc. with little or no change.
- During high stress events in the troop (introductions), Carole received benzodiazepine diazepam at varying doses for several months, which proved to be successful at reducing her signs of anxiety.

## Objective

- In an attempt to test the effects of alternative medication for the reduction of anxiety and stress in Carole, five herbal supplements were chosen based on the likelihood of the side effects as well as the existence of limited research trials performed in human cases.

- Lavender Flowers
- Valerian
- Chamomile
- Lemon balm/ Melissa
- Passionflower

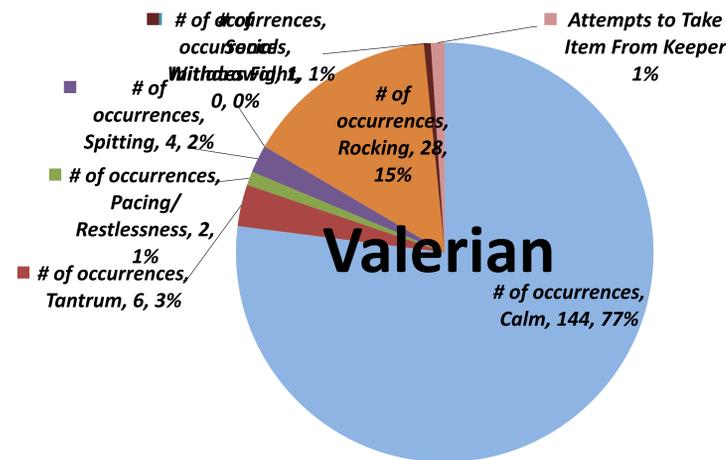
- This study attempts to identify baseline behavioral information for an individual with mild behavioral abnormalities responsive to benzodiazepine drug therapy, which can have side effects and can alter both individual and troop dynamics.

## Materials & Methods

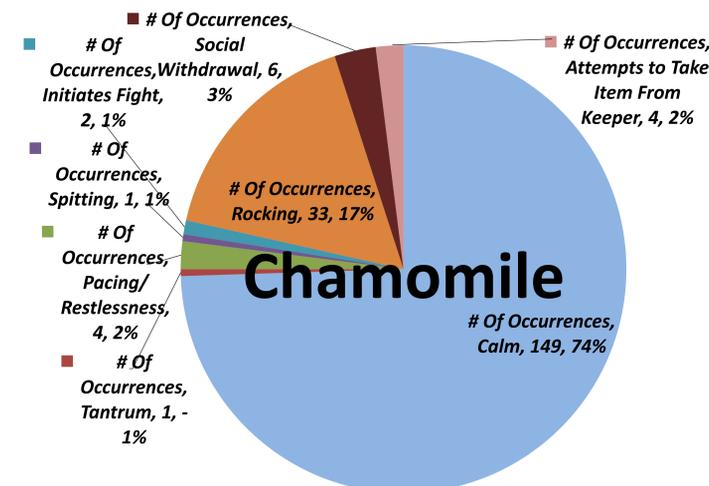
- The two weeks prior to the initial start of the study was used as a control period to obtain baseline data.
- Each supplement was administered orally for twenty-eight consecutive days ( trial #6 was thirty days) followed by a fourteen day washout period between treatments.
- The study was double-blinded and included the use of a placebo medication during the trial.
- Keeper staff observed the female chimpanzee during the normal work hours (8:30am-4:30pm) and documented the frequency and time of day various stereotypic behaviors occurred.
- Staff also documented the female chimpanzee’s level of participation in daily training sessions, any negative effects of medication such as drowsiness, and any confounding variables (e.g. troop dynamics, environmental changes).

## Results

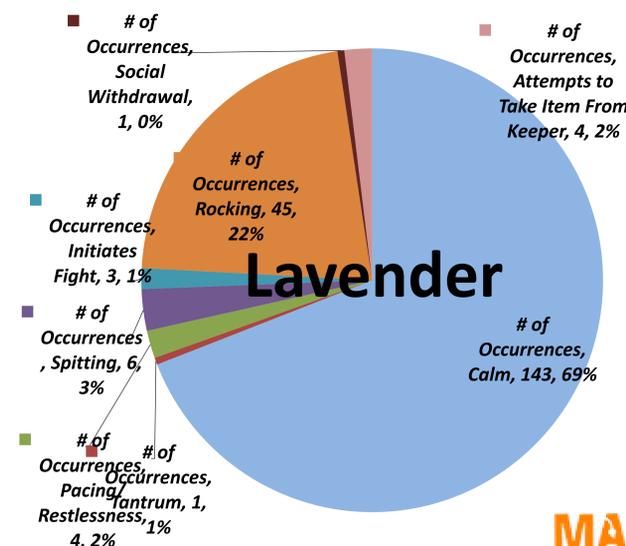
Trial 1- dose 500mg 1x per day for first 14 days then switched to 2x per day for last 14 days



Trial 2- dose 350mg 1x per day for 28 days



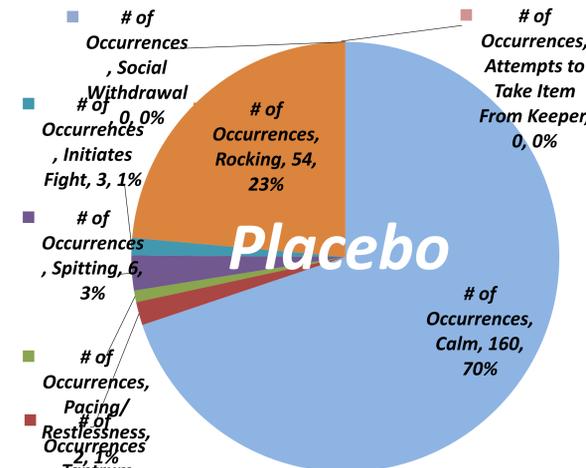
Trial 3- dose 400mg 1x per day for first 14 days then switched to 2x per day for last 14 days



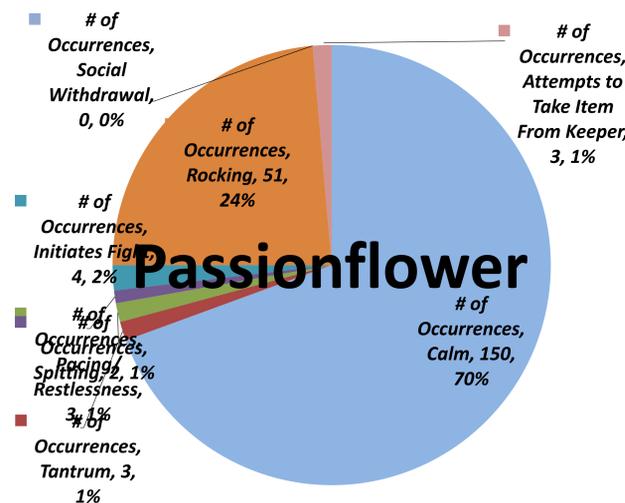
MARYLAND ZOO

## Results continued

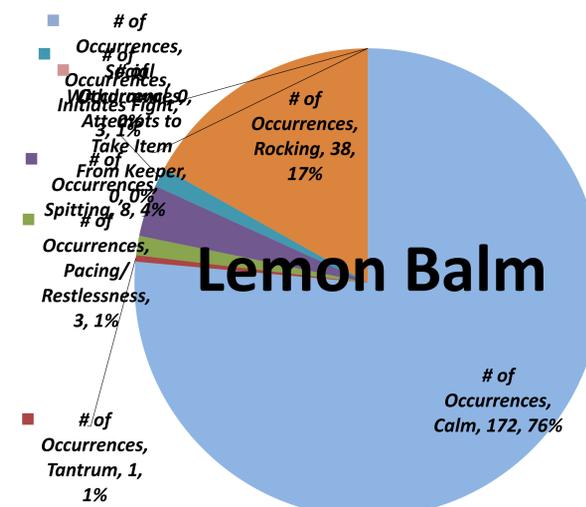
Trial 4- dose 1 capsule 1x per day for first 14 days then switched to 2x per day for last 14 days



Trial 5- dose 350mg 1x per day for 28 days



Trial 6- dose 500mg 2x per day for 30 days



## Conclusion

- Valerian, lemon balm, and chamomile had the highest “calm” behavior rating.
- Staff plan to do a second round of valerian , lemon balm, and chamomile for sixty day trials each.
- Will incorporate other female chimpanzees within the troop who have also exhibited stereotypic behaviors possibly linked to anxiety.
- Herbal supplements are widely used in humans for a multitude of ailments, including anxiety, but there are few objective studies regarding efficacy, dosage, and side effects.
- Although this study followed one individual, it provides the first information on the use of herbal medications in a great ape and attempts to objectively assess the effects and side effects of such drugs.



Photo Credit: Erin Dombroskie

## References

See handout or available upon request

## Acknowledgements

Thank you to the Maryland Zoo in Baltimore, especially Michael McClure, Margaret Innes, and Erin Cantwell for the help and support throughout the project; the keeper staff in Chimp Forest for collecting data during the study; the veterinary staff at MZiB for their assistance with medical care provided.

## Contact Information

[erin.dombroskie@marylandzoo.org](mailto:erin.dombroskie@marylandzoo.org)  
[pamela.carter@marylandzoo.org](mailto:pamela.carter@marylandzoo.org)  
[ellen.bronson@marylandzoo.org](mailto:ellen.bronson@marylandzoo.org)

# SOMEBODY'S WATCHING YOU:

## A cost effective method of unobtrusive animal observations

**Jen Holmes**  
**Hospital Keeper**  
**Disney's Animal Kingdom**

- ❖ 8 Channel HD TVI DVR
- ❖ HDMI Bullet Cameras
- ❖ Basic HD TV Monitor
- ❖ 1 TB Hard Drive
- ❖ 150 Ft Camera Cables



Photo taken in off-exhibit holding area

### Helmeted Guineafowl

- ❖ Presented with neurologic symptoms; medical treatment initiated.
- ❖ Video monitoring showed attempts to move but inability to stand or walk normally; continued treatment and monitoring



Photo taken in off-exhibit holding area

### Ruppell's Griffon Vulture

- ❖ Long term treatment for chronic bilateral pododermatitis.
- ❖ Made an exclusion drinker to keep her from soaking her foot bandages.
- ❖ Video monitoring captured her using the drinker!



Photo taken in off-exhibit holding area

### System Advantages:

- ❖ Video monitoring provides information about:
  - ❖ Food consumption, behavior; the need to make husbandry adjustments and enclosure/habitat changes
  - ❖ Compliance with medications
  - ❖ Introductions to other individuals
- ❖ Downloadable and shareable video
- ❖ Day and Night vision
- ❖ Easy set up and break down
- ❖ Storable in mobile media cart for use in multiple areas.
- ❖ Shareable with other animal areas/barns.
- ❖ Cameras are indoor/outdoor use



Photo taken in off-exhibit holding area

### Lemur Leaf Frogs

- ❖ Nocturnal species
- ❖ Video monitoring confirmed overnight activity and food consumption.



Photo taken in off-exhibit holding area

### Red Kangaroo

- ❖ Presented with neurologic symptoms; medical treatment initiated.
- ❖ Video monitoring showed attempts to move but inability to stand; continued treatment and monitoring.



Photo taken in off-exhibit holding area

### Wood Hoopoe

- ❖ Presented with neurologic symptoms; medical treatment initiated.
- ❖ Monitoring confirmed bird was eating well and showing regular improvement.



Photo taken in off-exhibit holding area

### System Disadvantages:

- ❖ Lots of wire (if no WIFI is available)
- ❖ Challenges placing cameras in optimal spots
  - ❖ They are designed to be permanently mounted
- ❖ TV and TVI system are weather sensitive
- ❖ Motion activation is very sensitive
  - ❖ Night vision showed bugs setting off the camera



Photo taken in off-exhibit holding area

**Sometimes they watch back!**

# Acclimating Red Pandas to their New Exhibit

Patricia Jarvis, Jarvisp2@si.edu  
Smithsonian's National Zoological Park

## INTRODUCTION

In spring 2016, the National Zoo introduced its red panda collection to a new enclosure, which included an outdoor yard and an off-exhibit indoor enclosure. Keepers found that the red pandas were spending most of their time indoors, thus inhibiting public viewing.

Our red pandas, Tusa and Asa (1:1), both came from different zoos and are housed together. Once the new exhibit was opened for the red pandas, both pandas chose to utilize their indoor enclosure and were rarely seen outside in their yard. In order to encourage them to utilize their yard, management changes were discussed and implemented based on behavioral observations during the course of the study.

It was my hypothesis that as the temperature decreased and management changes were implemented, then the red pandas would choose to spend the bulk of their time outdoors.

Findings observed from this study were presented to the zoo keepers and curator of Asia Trail. The purpose of this study was to encourage and increase the amount of time spent outdoors by our red pandas.

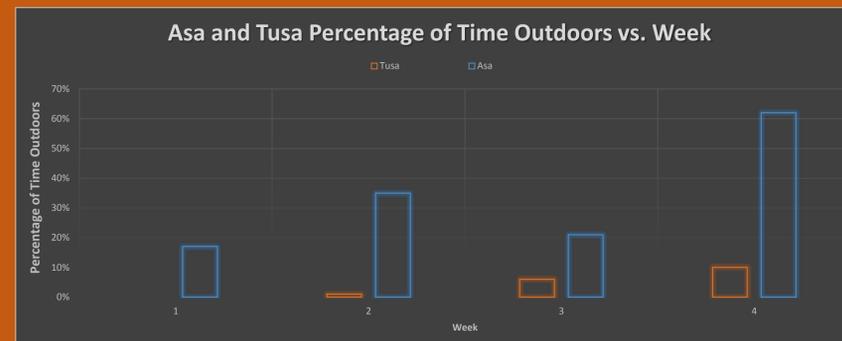
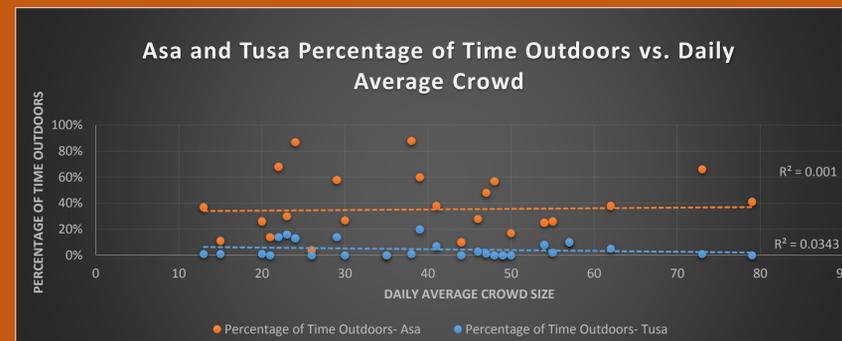
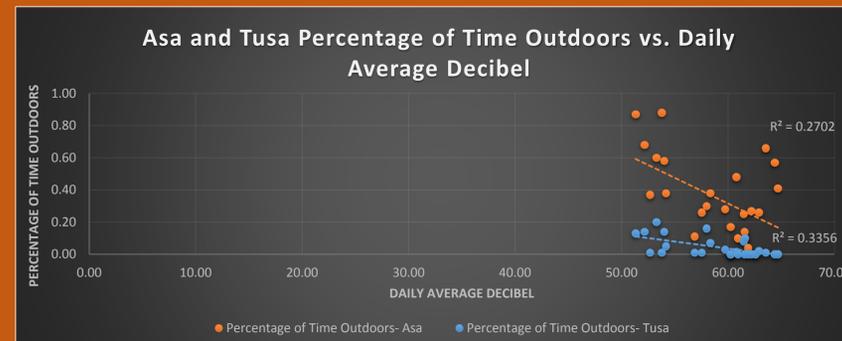
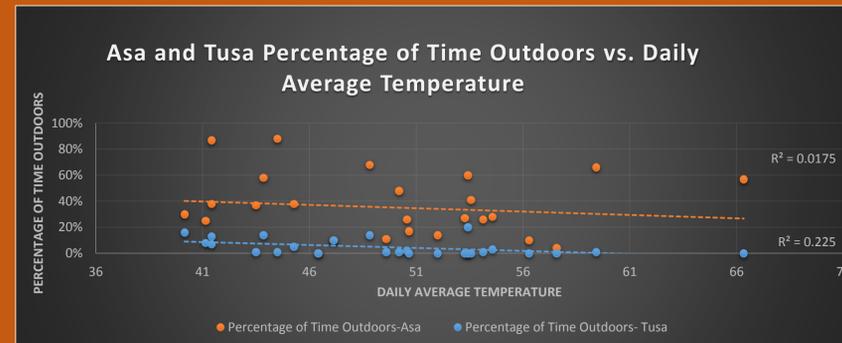


## METHODS

Over a four-week period, this study examined management changes (food placement, enrichment presentation, etc.) and environmental factors (temperature, decibel level, and crowd size) as they related to the percentage of time that each red panda spent outdoors. By measuring different variables and recording each red panda's location from 7am-3pm using rotating 15-minute watches, this study formed a conclusion about which factors may have had the most impact on the red pandas' decision to stay indoors. Data was taken from the end of October through the beginning of December.

- Week 1- No management change (baseline data)
- Week 2- Changed location of red panda biscuits from indoors to outdoors, all bamboo remained indoors
- Week 3- All biscuits remained outside, and half of the bamboo was placed outdoors. Later in the week, keepers added paper bags with biscuits to the yard for enrichment
- Week 4- All biscuits and bamboo were outdoors, the temperature of the indoor building was turned from 70 degrees to 75 degrees, and enrichment was continued

## DATA



## RESULTS

There was no significance in any of the measured environmental factors (temperature, decibel level, crowd size). This means that, based on the results of the regression analysis, it appears that no environmental factor played a role in either red pandas' decision to spend time outdoors.

## DISCUSSION

Since none of the measured environmental factors illustrated any statistical significance, this means that based on the data collected, it would appear that another factor played a role in the red pandas' decision to spend time outdoors. Some possibilities are:

- Management changes, which included moving food location from inside to outside.
- The change in temperature in the building in the fourth week may have impacted their decision to spend more time outdoors, although it should be noted that temperature outside did not seem to correlate with the red pandas' behavior.
- If the study occurred over a longer period, one or more environmental factors (temperature, decibel level, crowd size) may have had a statistical significance.
- It is also possible that over the course of the study the red pandas became more familiar with their yard and began to use it more due to having four extra weeks to adapt.



## CONCLUSION

It is my conclusion that the management changes our team put in place likely had the largest impact on the red pandas' percentage of time outdoors. I think this makes the most sense because the location of their food changed. Since the food was placed outdoors, the frequency of seeing the red pandas outside increased. Whether or not this was the only factor cannot be determined by this study, because the study only covered four weeks of location data, and therefore the hypothesis cannot be verified.

Additional investigations with a longer length of time would be a good future study to verify whether any environmental factors such as temperature, decibel level, or crowd size play a role in our red pandas' decision to spend time outdoors.

Zoos currently housing red pandas, or looking to bring red pandas into their collection, may find useful insights from the study's measurement of management changes and their impact on red panda behavior.

## ACKNOWLEDGEMENTS

I would like to thank my internship mentor, Marty Dearie for supervising my project and brainstorming management changes with me. Thank you also to the Asia Trail team who reviewed and made the appropriate weekly management changes to the red panda exhibit, and thank you to Michael Brown-Palsgrove, the Asia Trail Curator.

Photo Credit: Smithsonian National Zoo and J. Sveda

# Comparing Large Cat Growth Rates

Kathryn Juliano, Great Cats and Bears Keeper, Smithsonian National Zoological Park

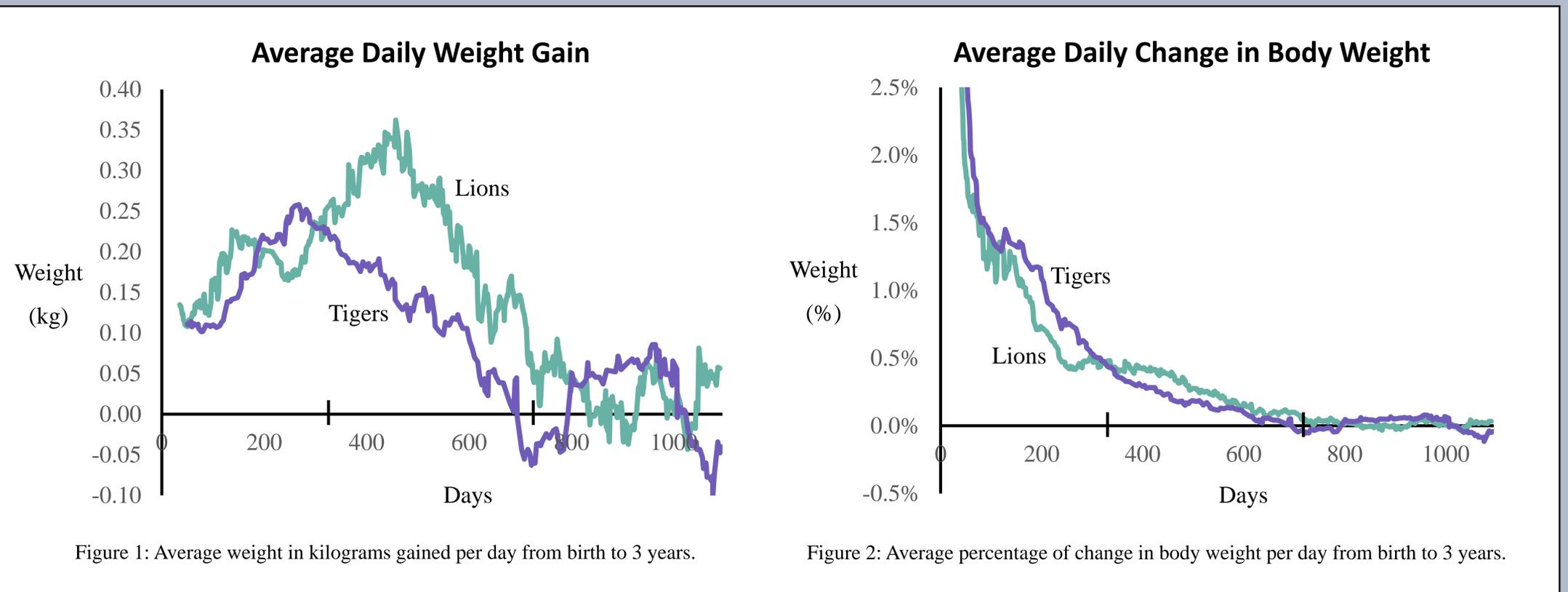
## Introduction

How quickly do large cats grow? When do they gain the most weight, and when do they stop gaining weight? Do lions and tigers grow at the same rate?

Every facility weighs their animals regularly, resulting in thousands of collected weights every year. Compiling these weights to create accurate growth models for large cats can help improve husbandry, nutrition, and veterinary care. Comparing weights between different felid species could also increase knowledge about development and growth in large carnivores.

## Methods

Weights from 16 African lions, *Panthera leo*, and 9 Sumatran tigers, *Panthera tigris sumatrae*, between birth and the age of 3, were collected at the Smithsonian National Zoo over the past 13 years. Weights were collected at varying intervals of days, weeks, and months. Data were then arranged by days of age and the average weight, in kilograms, gained or lost per day was calculated for the entire 3 year period. The average percentage of body weight gained or lost per day was also assessed.



## Results

Both species of cats gained weight at different rates when looking at average daily gain. Lions had a higher peak daily gain than tigers, and they reached their peak gain at a later point. Tigers began losing weight earlier than lions, and both lions and tigers gained again after previously losing weight. However, both species had similar growth rates when looking at the average percentage of body weight change per day.

- Peak daily gain: lions 0.45kg at 425 days, tigers 0.35kg at 250 days
- Negative daily gain: lions at 850 days, tigers at 750 days
- Peak % of body weight change: 6.85% at 9 days of age for lions
- Below 1% of body weight gain: lions at 150 days, tigers at 200 days

## Conclusions

In this study, lions and tigers differed greatly in their average daily gain, but overall their development was similar when looking at the percentage of body weight change.

Some of the results in this study were strongly affected by sample size, as weights were collected over various intervals. Future studies should seek to collect data on numerous animals from multiple institutions.

There is room, and need, for additional research based on weights from different species over a wide variety of topics. One potential subject is the connection between growth rates and natural behaviors. For example, Laurenson theorized that cheetahs grow faster than other large cats because of their natural behaviors and social structure. Are the differences between the social structures of lions and tigers similarly reflected by differences in growth rates?

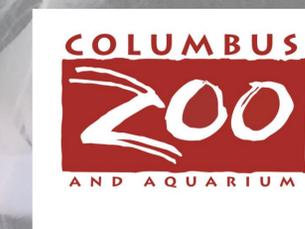
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Smithsonian  
National Zoological Park

# A Comparison of Substrate Changes with Caribbean Flamingo (*Phoenicopterus ruber ruber*) Foot Conditions



Joy Kotheimer,<sup>1</sup> Ian Hamilton,<sup>2</sup> Kevin Kollar,<sup>1</sup> and Mallory Seibold,<sup>1</sup>  
<sup>1</sup>The Columbus Zoo and Aquarium <sup>2</sup>The Ohio State University

## Introduction

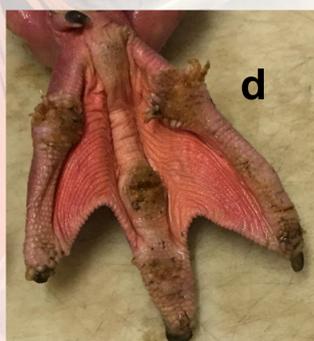
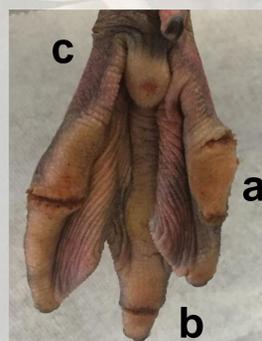
Foot lesions are a common concern for captive management of bird species, especially when individuals are housed in an area with artificial substrates for prolonged time periods. Ideal husbandry aims to prevent the occurrence of foot lesions by mitigating substrates to meet the specific needs of its occupants.

The objective of this study is to assess the effectiveness of substrate changes in holding areas by occurrence of foot lesions in the *P. ruber ruber* flock at the Columbus Zoo and Aquarium (CZA).

## Foot Lesion Classification and Severity

(Based on Neilsen et al. 2010<sup>1</sup>)

- a. **Hyperkeratosis** 1= epithelium flattened  
2 = marked overgrowth
- b. **Fissures** 1= <2mm 2= >2mm
- c. **Nodular lesions** 1= closed nodule  
2= open, exposed tissue
- d. **Papillomatous growths** 1= small finger-like proliferations  
2= clusters of proliferations



## Questions for each type of the lesion:

- 1) Does the total number of all lesions change, and differ between sexes and between birds raised at our facility versus another facility?
- 2) Does the number of severe lesions occurrences differ over time, controlling for the total number?
- 3) a) Does the most severe instance of each lesion differ for birds with at least one occurrence of the lesion  
b) Does the most severe level differ?

## Major substrate changes:

- 1) January 2011 to 2015: six artificial turf mats
- 2) January 2016 greenhouse : river rock/sand/topsoil floor
- 3) November 2016: Vinloop vinyl matting and Rubber-Cal anti-fatigue rubber matting

## Methods

- Weights and plantar photographs on individuals (at least once annually)
- Foot lesions and severities classified
- Effects on counts of lesions per foot, counts of severe lesions per foot, and the most severe instance of each lesion per foot were analyzed using Generalized Estimating Equations implemented in SPSS (Version 24).
- Tests on counts of lesions and counts of severe lesions used a Poisson distribution and log link function. Tests on most severe instance of lesion used a binomial distribution and logit link function.
- Fixed factors in all models were time period (1-3), sex (male/female), hatching location (CZA/other), and foot (right/left). Foot within bird was a repeated factor in all models
- Individual bird was included as a random effect and foot and date of collection were repeated effects in the models.

## Results

### Nodules

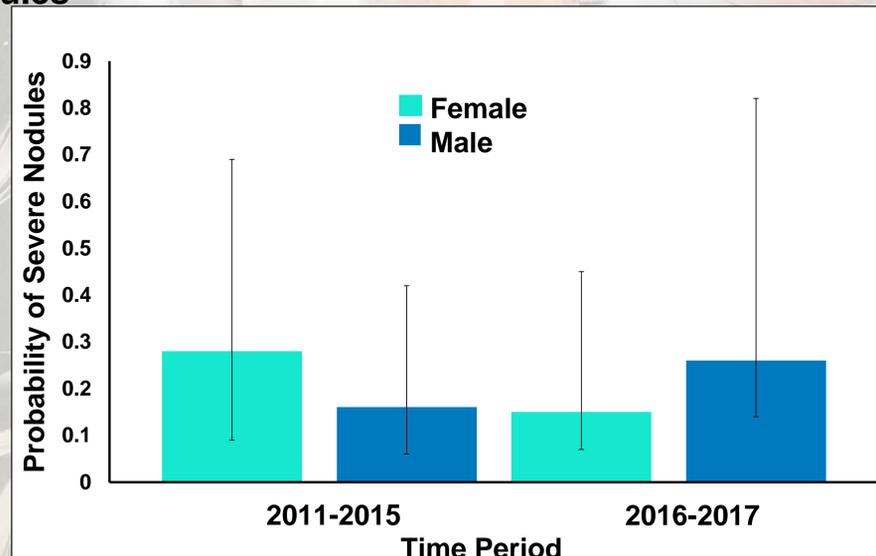


Fig.1. Probability of an individual (*P. ruber ruber*) having a severe nodule using estimated means compared between sexes and time periods (Wald  $\chi^2=8.47$ ,  $df=1$ ,  $p<0.004$ ). Error bars are displayed using a 95% confidence interval.

## Hyperkeratosis

- Total number of occurrences increase over time (Wald  $\chi^2=19.2$ ,  $df=2$ ,  $p<0.00$ )
- increased likelihood of more severe lesions in 2011-15

## Fissures

- CZA hatched birds more likely to have fissures vs other facilities for total number of all severities (Wald  $\chi^2=6.73$ ,  $df=1$ ,  $p<0.009$ )

Table 1. Probability of an individual (*P. ruber ruber*) having a severe fissure compared between time periods using estimated means (Wald  $\chi^2=4.52$ ,  $df=1$ ,  $p<0.033$ )

Period	Mean	Std. Error	95% Wald Confidence Interval	
			Lower	Upper
2015-2016	0.46	0.040	0.38	0.54
2016-2017	0.31	0.051	0.23	0.43

## Papillomatous growths

- Significantly fewer growths per individual (total number of all severities) in the 2016-17 versus 2011-15 (Wald  $\chi^2=8.51$ ,  $df=2$ ,  $p<0.014$ )

## Discussion

- New mats and substrates could promote fewer fissures and papillomatous growths, but other variables to consider
- Better manage individual's foot care using mat type
- Future goals: more seasonal foot pictures, foot inspection platform for parent-raised individuals, and investigate possible improvement for exhibit

## References

Neilsen et al. 2010. Classification and prevalence of foot lesions in captive flamingos (*Phoenicopteridae*). *Journal of Zoo and Wildlife Medicine* 4(1) 44-49.

## Acknowledgements

Thanks to my coworkers in the Shores region, Becky Ellsworth, and vet staff at the Columbus Zoo and Aquarium for data collection, discussion of results and working to always strive to improve animal care. Thank you to AAZK Grant Committee for the honor being selected for the Professional Development Award to attend and present at the 2017 National AAZK Conference. A big thank you to Ian Hamilton for hours of sorting through data and discussing results with me for this project. Thank you to the Ohio State University and Owens Corning have donated mats to use in our holding room.

# LOOK OUT! IT'S A THOR-NADO!

## TARGET TRAINING TO REDUCE AGGRESSION IN 1.0 NAVAJO CHURRO SHEEP (*Ovis aries*)

Kimberly Kruse and Stephanie Sanchez



### Introduction

Target and station training were initiated with 1.0 Navajo Churro Sheep “Thor” due to increasing aggression towards keepers. Physical contact was made with several keepers, which resulted in injuries. A training plan was developed to reduce ramming behavior and offer him a reinforcing activity. This individual previously underwent a hemi-castration due to a cryptorchid testicle. Due to this, his testosterone levels are similar to those of a fully intact ram. Protected contact was not possible in the exhibit, requiring the group of 3.2 to be managed free contact. A positive reinforcement training plan was chosen to reduce aggression, modify behavior and improve animal husbandry.



1.0 Navajo Churro Sheep “Thor”



Second keeper operating shift doors

### Exhibit and Holding Area Set-up



Red = Shift doors  
Blue = Keeper doors



Thor targeting nose to green dot

### Methods

Initially training was done free contact in Stall 2, which resulted in an unsafe environment for the trainer. The primary trainer was then moved into the temporary green pen to create a protected contact situation.

An additional obstacle with this group was a high propensity for flocking behavior, complicating the separation from conspecifics outside of the normal feeding routine for training. Training sessions were coordinated with routine feeding times and an additional keeper was added to facilitate shifting to separate individual.

Thor was not able to fully engage with training while using the trainer’s hand as both the target and mode of delivery for reinforcements. This confusion was eliminated by changing the target from a hand to a green dot and by changing method of delivering reinforcement from hand feeding to placing it on the ground.

### Results

Complications arose with the training plan and adjustments were necessary to both protect the trainer, and keep Thor’s attention and interest. Thor’s aggression and confusion were minimized by re-arranging and adjusting the antecedent conditions of the training sessions including safety issues that existed with the topography of the exhibit. These modifications enabled Thor to learn quickly, and the training was able to be performed by others without difficulty once it was completed. There was a general decrease in aggression towards the primary trainer, however overall aggression was still noted outside of training sessions by other keepers.

### Discussion

Thor’s undesired ramming behavior was still present. It was not only contingent on his natural and personal history, but past learning experiences and most importantly by his current interactions. Due to staffing changes and lack of consistency amongst all keepers in regards to interactions with the animal, positive reinforcement training was discontinued. An alternate route of extinction training is currently being used.

In the future a behavior change program needs to address not only this animal’s behavior problem, but the keepers’ resources and ability to implement. A training plan could be devised combining extinction and positive reinforcement training, offering differential reinforcement of alternate behavior. With this approach the animal could learn new behaviors that would be beneficial to management, while ignoring undesired behaviors.

**Acknowledgments:** Thank you to the Collection Manager, Becky Manning and to the entire Farm/Equine staff. Thank you to Kari Musgrave DVM and Sheri Croce CVT.



# Stepping Inside the Box: Creating a Nyala (*Tragelaphus angasii*) Interaction Area

By: Christy Layton, Animal Care Specialist, Busch Gardens Tampa

## Introduction

At Busch Gardens Tampa, we are always trying to find new and creative ways for guest interactions. Guests like to be able to see our animals up close to make a lasting connection. The hoofstock department went through our animal collection to see which species might make the best connection with our guests. The nyala (*Tragelaphus angasii*) seemed to be the best choice because the herd is calm, food motivated, and easy to work around.

## Building the area

- Chose to use existing shade shelter
- Exterior gate already present for easy access
- Fencing was run along the shelter just added poles for support and enlarging area
- Able to use existing materials to complete the project
- Finished area approx. 6.5ft x 22ft

## Materials Used

- Reclaimed wooden post
- No-climb fence
- Standard 5ft residential gate
- Cedar 2 x 4 boards
- Shade shelter that was already in place



## Conclusion

The area is now being used for unique moments and guest tours. By allowing such an up close interaction with our guest, we can provide a lasting conservation message and show how important this species is. The nyala have also adjusted well to this interaction area due to the high tour traffic, summer camps, and other programs. This has been a perfect way to combine animal interactions and be able to provide a one on one conversation with guest.

## Conditioning the Nyala

- First started with desensitizing the herd to the area
- Placed produce/browse along the fence line
- Once comfortable with this, keepers were added and began to feed them through and over the fence
- A tone (bike bell) was added to reinforce the nyala for approaching the area

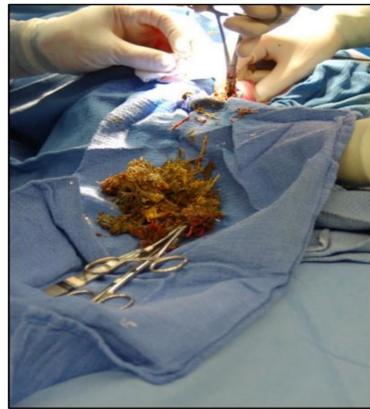
## Who is utilizing the area

- Resident and day camp groups
- Keeper for a day programs
- Unique experiences for general park guest
- Behind the scenes tours for other departments



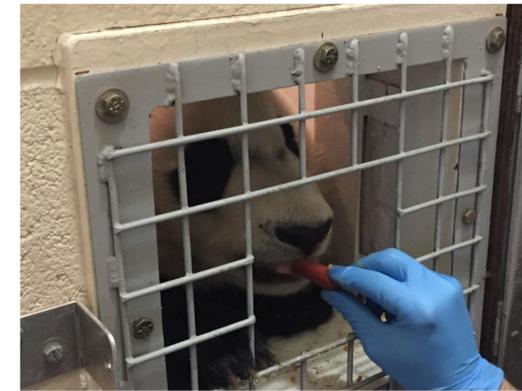
## Acknowledgments

I would like to thank my team for helping to make this happen Megan H., Sarah B., Alyson K., Pandy S., and Jerry W. A special thanks to my supervisor, Cara M. and Assistant Curator, Jason G., for letting me spear head this project.



# BEI BEI'S BAMBOO BEZOAR

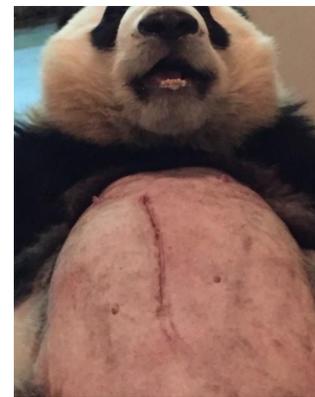
Nicole MacCorkle, Animal Keeper, Giant Pandas  
 Laurie Thompson, Assistant Curator, Giant Pandas  
 Smithsonian's National Zoo



In late November 2016, our juvenile male Giant Panda (*Ailuropoda melanoleuca*) presented with extreme lethargy, inappetence, and subdued demeanor. While these are common symptoms prior to passing a mucus stool, he also had vomiting and retching, which typically are not. After 24 hours of monitoring by keepers and veterinarians, it was clear that this was not the result of a mucus stool. Specialists were called in, and an ultrasound was performed under anesthesia. An impassable bezoar of digested bamboo was discovered at the duodenum of his small intestine. A veterinary surgical specialist performed life-saving surgery, removing a lemon sized bezoar of bamboo. Below we have highlighted the roles of each department during Bei's recovery. This case had a very successful outcome due to teamwork and two very compliant and adaptable bears.

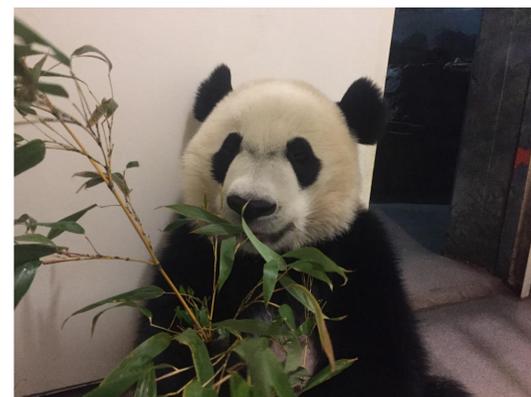
## WILDLIFE HEALTH SCIENCES:

- Monitor illness, perform physical exam, and assist in surgery
- Post-surgery recovery
- Prescribe/monitor medications and pain management
- Daily monitoring of incision
- Consult with nutrition on diet restrictions (no bamboo for 3 weeks)
- Clinical case resolved mid-January



## DEPARTMENT OF NUTRITION:

- Temporarily remove bamboo from his diet
- Soft/soaked foods only for the first few days post-surgery
- Fed small meals several times per day
- Formulated bamboo biscuit
- Reintroduced bamboo very slowly in very small amounts
- Daily communication with animal care as diet changed



## ANIMAL CARE:

- Post-surgery monitoring including daily incision checks
- Managed separation from Mei Xiang for 24 hrs post-surgery
- Multiple medications given daily (gel caps to mask flavor)
- Managed indoors for 8 wks to prevent eating grass/plants/branches
- Shifted between enclosures multiple times per day for feedings
- Enrichment given as he started feeling better
- Staff worked round the clock for the first week (11/25-12/2)
  - Worked until midnight the next week (early shift in at 4:30am)
  - Worked until 11pm for 5 weeks (early shift in at 4:30am)
  - Normal shift resumed after 2 months
- Weaned as planned on March 1st



### Mei Xiang's management:

- Only fed bamboo in outdoor yard (so that Bei couldn't eat any bamboo)
- Shifted inside 3-4 times a day to socialize with Bei
- Remained outside with bamboo until 11pm, then shifted inside w/Bei (no bamboo)
- 1/7/17-As small amounts of bamboo were added inside overnight, MX was brought inside earlier
- Increased amounts of bamboo by 2-4kg until Jan 20 (regular overnight amounts of 22kg)



### ACKNOWLEDGMENTS

We would like to thank the following people, whose combined efforts resulted in a successful outcome for 1.0 Giant Panda Bei Bei:

The NZP Wildlife Health Sciences Department  
 Dr. Sebastian Gordon, Veterinary Surgeon  
 The NZP Department of Nutrition  
 Michael Brown-Palsgrove, Curator of Asia Trail/Giant Pandas  
 The Asia Trail/Giant Panda Staff and Volunteers

# Training 4.0.0 Miniature Mediterranean Donkeys (*Equus asinus*) for Medical Behaviors and Visitor Demonstrations

Nikki Maticic, Animal Keeper  
Smithsonian's National Zoological Park

## Background

- Previous training work
  - Target
  - Walking on a lead for weights and to/from yards
  - Demos included enrichment, walking animals on leads, and petting/brushing
- Current training objectives – Medical and increased visitor demonstration focus
  - Target
  - Voluntary injections/voluntary standing in squeeze
  - Station
  - Object retrievals
  - Open mouth

## Training Methods and Procedures

- 4.0.0 Miniature Mediterranean Donkeys (*Equus asinus*), aged 15-16 years old, are housed within the Kids' Farm exhibit. In 2016, new behaviors with a medical and public-demonstration emphasis, became the focus of training for this herd of donkeys
  - Their training has evolved to include the following:
    - Target, voluntary injection/blood work, open mouth, object retrieval, and station behaviors
- Training Procedures
  - Having donkey voluntarily approach fence area for tie ups during training
  - Target presentation
  - Target into squeeze area, associating area with positive rewards
  - Remain in squeeze for periods of several minutes using target
  - Desensitize to door touching and being held on body
  - Introduce injection practice stick while in squeeze
  - Hold injection practice stick on rump and neck area for varying lengths of time/pressure while in squeeze



Figure 1: Working with the target pole



Figure 2: Initial work of entering squeeze using target pole



Figure 4: Initial cue presentation for open mouth behavior

## Training Outcomes

- 4.0.0 Donkeys have completed target, voluntarily entering squeeze/voluntary blood draws, open mouth, and station behaviors
  - Working on duration at station markers and object retrievals
- Able to request open mouth, retrieval, target, and station behaviors in public demonstrations
  - Incorporate training into public demonstrations
  - Increased interactions with public by training along side public areas in yard
  - Educate public about importance of positive training



Figure 3: Practicing duration at station marker

## Discussion

- Challenges
  - Desensitizing donkeys to squeeze area and injection practice stick
  - Determining the best way to train the social group as individuals prior to beginning station training
- Medical training
  - Donkeys have calmer demeanor during vet exams/injections
  - Able to have donkeys enter into squeeze and request other behaviors readily and reliably
  - Successful voluntary administration of vaccines for annual exam
- Visitor demonstrations
  - Donkeys have increased interactions with visitors during training demonstrations

## Future Training

- Training donkeys for additional demonstrations such as agility work and voluntary hoof/dental work
- Building up duration at station markers for veterinary procedures and retrieval with different objects
- Applying training methods to other animals
  - Working on agility, station, and hoof work with goats, and voluntary squeeze entry, hoof work, and injection training with cows



Figure 5: Using practice pole for working on injections



Figure 6: Presenting cue for open mouth



Figure 7: Working on building up duration at station marker

## Acknowledgements

- Smithsonian's National Zoo
  - Lion/Tiger, Andean Bear, and Kids' Farm Unit
  - Enrichment and Training Committee
- Kate Olsen - Elmwood Park Zoo
- Genevieve Warner
- AZA's professional development courses
  - *Enrichment and Training Applications in Zoo and Aquarium Settings*



# First Successful Foster of Captive-born Mexican Wolf (*Canis lupus baileyi*)

## Pups Into a Wild Litter

Regina H. Mossotti, Emma G. Miller and Tracy G. Rein

Endangered Wolf Center, St. Louis, Missouri

### Introduction

In 1976, the Mexican wolf was listed as an endangered species after nearly being eliminated due to loss of habitat, predator control programs, disease, and decline of prey species. The last remaining Mexican wolves were captured from the wild between 1977 and 1980 and a captive breeding program was established in 1977 with seven founding members of the Mexican wolf population.

In 1998, U.S. Fish and Wildlife Service (FWS) released eleven Mexican wolves into the wild in the Blue Range Wolf Recovery Area of New Mexico and Arizona. In 2013, a small group of individuals were introduced to the wild in Mexico. In February 2017, there were 113 known Mexican wolves in New Mexico and Arizona and less than 30 in the wild in Mexico. There are ~260 individuals in managed care.

Current challenges to the wild population include public perception of the wolf and low genetic diversity. While public perception of the wolf can be addressed via educational programs, increasing the genetic diversity can only be done by releasing more wolves into the wild from the captive population. The ground-breaking effort of fostering captive-born pups into wild litters is a new conservation management tool for Mexican wolves that will help increase the genetic diversity of the wild population. This is an excellent example of how zoos and breeding centers play a major role in the conservation of critically endangered species.



FIGURE 2. Litter of Mexican wolf pups born at the Endangered Wolf Center on April 15, 2016. Two pups were placed in a wild litter in New Mexico on April 23, 2016 - nine days old.

### Methods

- Observed breeding ties and communicated with FWS about potential due dates of dams in captivity so FWS could match due dates with wild packs.
- Communicated with FWS as soon as captive dam's labor behavior started. This allowed time to see if wild packs showed denning behavior.
- Three days after the pups were born, Animal Care Team entered the den to count and inspect the new born pups to assess health and sex.
- Once wild den was confirmed, flight was scheduled. The captive pups were removed from den at EWC at last possible moment before boarding the plane. Staff entered the den to remove pups. The two largest and most vigorous pups were selected. A quick vet health assessment was done to ensure they were healthy and did not have any birth defects.
- Initial weight and temperatures of the pups were recorded. Staff gently rubbed a damp cotton ball on the pups' anal-genital areas to stimulate urination /defecation, mimicking dams tongue.
- Reduction of scent transfer from humans to pups was a priority. Gloves were worn at all times when handling the pups.
- Staff members flew pups from St. Louis, MO to Albuquerque, NM.
- Bottle feeding was unsuccessful, so pups were given 15mL Esbilac Puppy Formula via tube feeding every 3 hours.
- During feedings, staff took pups' rectal temperatures and helped the pups to urinate/defecate. A thermometer was placed in the crate to ensure ambient temperature stayed between 70 - 80°F. Handwarmers/and towels used to keep crate warm.
- When EWC team arrived at the Blue Range Recovery Area, the team hiked with the pups to the wild den. Biologists placed pups in a litter of five wild born Mexican wolf pups - increased wild litter to seven pups.
- Wild and captive pup's scents (urine/den dirt/feces) were rubbed on each other to make them all smell the same. Wild den disturbance was minimal.

### Results

In April and May 2016, four Mexican wolf pups born at the Endangered Wolf Center in St. Louis, Mo were fostered into two wild Mexican wolf litters, one in New Mexico and one in Arizona. Two pups (1.1) were fostered into the Shepherders Baseball Park Pack (NM) and two (0.2) were fostered into the Panther Creek Pack (AZ). Two pups (1.1) born at the Brookfield Zoo were fostered into the Elk Horn Pack in May 2016.

By the fall of 2016, two of the six pups were confirmed alive. One of the pups fostered into the Panther Creek Pack was observed via trail camera by the Mexican wolf Interagency Field Team (IFT). IFT captured m1471, who had been fostered into the Elk Horn Pack, and fitted him with a radio collar. The whereabouts of the other four pups remain unknown, but FWS is hopeful that more survived and that they are just elusive and have not yet been seen.



FIGURE 3. A. New Home: Blue Range Recovery Area, in New Mexico where first two pups were fostered. B. Regina Mossotti, with two pups in her backpack, hiking at 8,000 ft elevation with Emma Miller and team to the wild den in NM.

### Discussion

Fostering captive-born Mexican wolf puppies into a wild litter is an effective conservation technique to increase the genetic diversity of the wild population. Through coordination between the Endangered Wolf Center and the U. S. Fish and Wildlife Service, four captive-born Mexican wolf pups were fostered into a wild litter in the spring of 2016.

Fostering captive-born Mexican wolves into the wild has many benefits for the wild population including:

- Increases the genetic diversity of the wild population
- Increases critically endangered population in the wild
- Wolf pups are raised by experienced, wild parents—increasing pup's chances of survival

The success of the 2016 foster efforts led FWS to complete two more fosters in 2017—two pups from California Wolf Center, Ca. (CWC) and two pups from Brookfield Zoo, Il. (BZ) were fostered into two different litters in Arizona. The litters had six puppies before the foster, so to give the pups the best chance of survival and not overwhelm the pack with too many pups, two of the wild pups were removed and taken back to CWC and Brookfield Zoo and were fostered into the captive litters. This technique of “cross-fostering” may be beneficial in the future to help increase the genetic diversity of the captive population, as well as give the captive pups placed in the wild the best chance of surviving and increasing genetic diversity of the wild population. The success of these efforts has led FWS to incorporate fostering into FWS's newly released Mexican Wolf Recovery Plan.

### Acknowledgments

Thank you to the United States Fish and Wildlife Service Mexican Wolf Recovery Team (especially Dr. Susan Dicks and Maggie Dwire), the Interagency Field Team, Arizona Game and Fish Department and the AZA's Mexican Wolf Species Survival Plan. Thank you for the dedication and passion shown by the Animal Care Team (in addition to above staff, Sarah Holaday, Danielle Rosenstein, Jeremy Martin and Matt Fox) and all of the staff, interns and volunteers at the Endangered Wolf Center: Thank you to EWC Board Member, veterinarian Dr. Rhiannon McKnight, for assisting with the second foster event. And we could not have accomplished these conservation efforts without the support of our dedicated members, donors and supporters.



FIGURE 1. Mexican wolf female 1462 “Vida” in New Mexico, being checked by EWC's Director of Animal Care and Conservation Regina Mossotti, shortly before being placed into the wild litter.

# CREATING PROFESSIONAL DEVELOPMENT OPPORTUNITIES FOR KEEPERS AT SMALL, RURAL FACILITIES



Ruth Steel Mock  
Sequoia Park Zoo

American Association of Zoo Keepers, Redwood Coast chapter

## PROBLEM

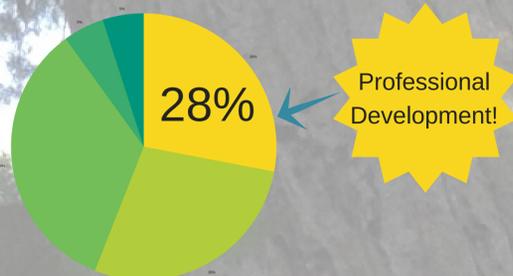
Keepers at small, rural facilities may have limited opportunities for professional development.



## SOLUTIONS

THROUGH YOUR LOCAL  
AAZK CHAPTER

Designate chapter funds for professional development



1) Determine a percentage in the chapter's bylaws  
Redwood Coast AAZK allocates 28% of money raised at general fundraisers (i.e. any fundraiser not specifically raising money for a conservation cause like Bowling for Rhinos) to the Professional Development fund. Remaining funds are disbursed with 34% into the General Fund, 28% into the Conservation fund, 5% into the Enrichment fund, and 5% into the Education fund.

2) Vote on fund use  
e.g. designate funds to host a guest lecturer  
e.g. offer a grant for conference attendance

Redwood Coast AAZK offers an annual grant for members to attend the National AAZK conference and, if funding allows, a second grant to attend any conference relevant in the field.

Chapter members lead skill-share workshops



Topic examples:  
animal training  
enrichment construction  
hose repair  
species natural history  
tool use  
interview skills

Develop an MoU

Redwood Coast AAZK and its host institution (Sequoia Park Zoo) signed a Memorandum of Understanding (MoU) that allows use of zoo grounds for:

- meetings
- skill-share workshops
- outreach & education during zoo events
- fundraising opportunities



## MORE RESOURCES

Grants for research and conference attendance from National AAZK

Shadow keepers at other facilities

Animal training books

- Karen Pryor
- Ken Ramirez

Social media resources for networking, information, and problem-solving

Facebook groups such as

- ZooKreepers
- Husbandry groups (e.g. Gibbon Husbandry)
- SSPs and TAGs (e.g. EAZA Small Carnivore TAG)

Online resources and webinars

Barbara's Force  
Free Animal  
Training



ANIMAL  
TRAINING  
ACADEMY

THE  
SHAPE  
OF ENRICHMENT

SAN DIEGO ZOO  
GLOBAL.

## Acknowledgements

Thank you to Redwood Coast AAZK for funding my attendance at this conference and for their enormous annual efforts in conservation and improving animal care. Thanks to the Sequoia Park Zoo for supporting our desire to grow, educate, and expand our impact.

American Association of Zoo Keepers Grants Committee

Grants the committee oversees:

## The AAZK Professional Development Grant

## The AAZK Conference Professional Development Grant

### Deadline March 1

The AAZK Professional Development Grant is designed to assist AAZK members with costs associated with attending professional meetings or workshops, or, participating in field research *not* associated with the AAZK National Conference. \$2000

The **AAZK Conference Professional Development Grant** is designed specifically for assisting AAZK members with costs associated *with attending* the AAZK National Conference. \$1000

## The AAZK Conservation, Preservation and Restoration Grant

### Deadline March 1

The purpose of the AAZK CPR Committee's Zoo Keeper Grant in Conservation is to encourage and support efforts in conservation conducted by AAZK members in zoological parks and aquariums around the world. \$1000

## The AAZK Research Grant

### Deadline March 1

The purpose of the AAZK Research Committee's Zoo Keeper Grant in Research is to encourage and support efforts in non-invasive research conducted by AAZK members in zoological parks and aquariums around the world. \$2000

Grants the committee scores for other committees:

## International Outreach Committee – AAZK Conference Latin America Travel Grant

### Deadline January 1 (pending approval)

This grant will be available to Latin American keepers. The AAZK Conference Latin America Travel Grant will aid Latin American keepers in financing their travel and expenses associated with the annual AAZK conference. \$2000

## AAZK – Trees for You and Me Grant for Reforestation Deadline September 1 (pending approval)

The Trees for You and Me Grant is a forest-based carbon offset grant with funds generated by AAZK chapters hosting Trees for You and Me fundraising events! This grant furthers AAZK's and PBI's quest to fight climate change by asking for grant applicants that will use it for reforestation and habitat revitalization. Amount depends on fundraiser amount.

Other grants offered by AAZK

## AAZK Bowling for Rhino Conservation Resource Grant

### Deadline June 1

The American Association of Zoo Keepers (AAZK) is offer the Bowling for Rhinos Conservation Resource Fund. This competitive grant is designed to fund projects focused on rhino conservation and research. Amount depends on fundraiser amount.

## Qualifications

Full-time keepers or aquarists in zoological parks and aquariums, who are professional members of AAZK in good standing, are eligible to receive AAZK grants. **Grant applications from non-members of AAZK are accepted for specific Grants – please carefully read the Grant Application Instructions for each Grant to determine member requirements.** Researchers other than zoo keepers may participate in the funded studies. The principal investigator, however, must be a keeper/aquarist.

**The AAZK TYFM Reforestation Grant, Bowling for Rhinos Conservation Resource Grant and the IOC – Latin America Travel Grants are available to Non-members of AAZK.**

## Restrictions

The Grants Committee will not fund any invasive biological studies, or any study that may cause an animal undue or prolonged discomfort or harm. Travel grants are awarded based on the applicant's experience and dedication to the zoo/aquarium field,

the value of the travel objective to the member and their institution, as well as the Grant Committee's assessment of the conservation/research value of the program the applicant will be participating in.

New members wanted!!! The committee will be seeking 2 new members shortly after the new year. Watch Facebook and the AKF for calls for new members and how to apply.

# Tiger Talk – Utilizing Common Communication Signals to Identify Estrous in A Sumatran Tiger (*Panthera tigris sumatrae*)

## Introduction

Introducing a pair of tigers for a breeding recommendation can be dangerous – especially if the female is not cycling.

Fortunately, tigers show signals that indicate when a female is in estrous.

This particular female frequently showed estrous signals and we needed to pinpoint her cycle.

## Purpose

Determining the female's estrous cycle could increase breeding success and reduce potentially fatal introductions in a new pair of tigers.

## Methods

Estrous related behaviours were recorded daily throughout several months to determine female's cycle.

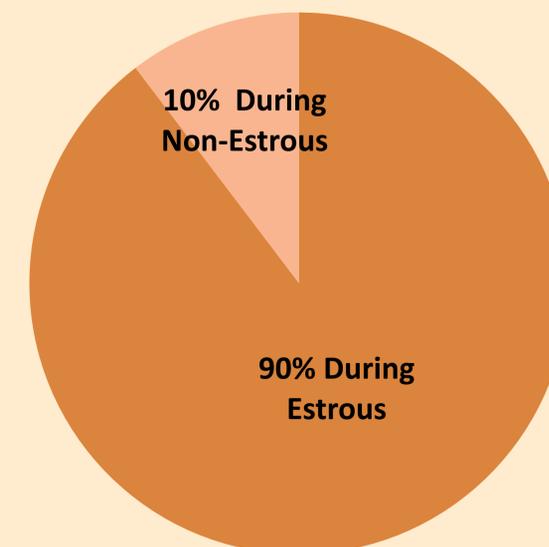
## Results & Conclusion

- The average length of the female's estrous cycle was 8 days long with a 31 day interval.
- Female's breeding behaviors were as expected – plenty of calling, rolling and chuffing.
- Male became significantly more vocal during female's estrous.
- **The unusual finding was that he only chuffed at her when she was in estrous; very rarely in-between cycles. A smoking gun to indicate estrous!**
- In this case, the male's signals turned out to be much more definitive than the female's.
- **FINAL RESULT – 2 cubs!**



Photo credit: Craig Salvus

## Male Tiger – Total Time Spent Chuffing at Female





# Nesting Behavior in Zoo-Housed Orangutans (*Pongo spp.*)

Alexandra J. Reddy, MS and Meredith L. Bastian, PhD  
Smithsonian's National Zoological Park

[redya@si.edu](mailto:redya@si.edu), [bastianm@si.edu](mailto:bastianm@si.edu)

## Abstract

Like their wild counterparts, zoo-housed orangutans make nests daily when given adequate materials, suggesting that the primary function of orangutan nests is for rest and sleep, and that orangutan nests are similar to human beds. As part of a larger study, we disseminated a survey throughout the Association of Zoos and Aquariums (AZA) with the aim to document the use of preferred nesting materials, locations, and innovative behaviors observed in the nesting context in zoo-housed orangutans. We present a summary of survey results, indicating the presence of at least one behavior that occurs only rarely (7% of the 31 facilities surveyed), as well as several universal patterns of nesting behavior across institutions. We also report an interesting behavior in the nesting context that is exhibited more often by females than by males ( $\chi^2 = 4.390$ ,  $df = 1$ ,  $p = 0.036$ ).



Aurora & Cheyenne, Houston Zoo  
Photo by Tammy Buhrmester

## WATER LICKER PLUGGING

- Sex difference: significantly more females than males plug lickers across AZA facilities ( $\chi^2 = 4.390$ ,  $df = 1$ ,  $p = 0.036$ ).
- Of 28 AZA facilities with known licker pluggers, 17 have at least one orangutan who frequently builds nests in close proximity to plugged lickers, although no sex difference of which individuals build nests under or adjacent to plugged lickers ( $\chi^2 = 1.589$ ,  $df = 1$ ,  $p = 0.207$ ).

## NEST SHARING

- During the day, nest sharing was seen at four (13%) zoos. Overnight, nest sharing was seen at Smithsonian's National Zoo (NZN) and only one other facility (7%).
- At NZN, 1.1 and 0.2 adult orangutan dyads shared a single night nest in nearly 3% (22/855) of all recorded night nests.



Baka & Sumagu, Cheyenne Mountain Zoo

## NEST LOCATION PREFERENCES

- 100% of surveyed zoos reported giving their orangutans opportunities for building elevated nests, 87% of which reported at least occasional nesting above ground, although ground nesting is most typical.

## NEST MATERIALS & EMBELLISHMENTS

- Orangutans throughout AZA are provisioned with a wide variety of potential nesting materials, most frequently hay or wood wool, various types of cloth (sheets, blankets, towels), cardboard, paper, and browse.
- At NZN, browse was incorporated into 93% of night nests.

## Results

SCENARIO	# OF ZOOS	%
Elevated nest opportunities	31/31	100%
Elevated nests made at least one orangutan	27/31	87%
Lickers plugged by at least one orangutan	28/30	93%
Lickers plugged changing water flow	2/28	7%
Nests built close to plugged lickers by at least one orangutan	17/28	61%
Day nest sharing by at least one pair of adults	4/31	13%
Nest sharing by at least one pair of adult orangutans overnight	2/31	6%

MATERIALS USED TO PLUG LICKERS	ITEMS PLACED UNDER PLUGGED LICKERS
<b>Natural Material</b> browse, coconut shells, coffee beans, feces, hay, pebbles, rocks, sticks, straw, wood wool	<b>Natural Material</b> chow/other food, feces, hay, nests, wood wool
<b>Discarded Produce</b> banana tips, carrots, cucumbers, kale stems, lettuce, orange peels	<b>Cloth</b> blankets, clothes, felt, fleece, sheets
<b>Paper Products</b> cardboard, paper - various types, magazine/newspaper	<b>Paper Products</b> cardboard, paper - various types
<b>Plastic/Rubber</b> construction cones, plastic straws, rubber hose	<b>Plastic/Rubber</b> bottles, bowls, buckets, construction cones, cubes, hard hats, kiddie pools, pitchers, PVC caps, sand boxes, toys - various types, tubs

## Summary

- Ground nesting is the norm for zoo-housed orangutans, despite all 31 facilities providing multiple options for elevated nesting.
- Nest sharing between two adult orangutans overnight is rare across AZA institutions, reported at only one facility besides NZN.
- While Reader & Laland (2001) report a male bias in a survey of innovative behaviors across primates, licker plugging in zoos is not either risky or energetically costly. Nearly all zoos surveyed report at least one licker plugger, revealing a female bias, which is consistent with Lonsdorf (2005).
- The process of spreading innovative behavior within populations of zoo-housed orangutans may also be similar to the natural circumstance under which imitation appears in chimpanzees, identified by Lonsdorf (2005) as long-term, repeated interactions with a well-known individual, a condition which is likely required to learn licker plugging behavior.



Lucy, Smithsonian's National Zoo  
Photo by Alexandra Reddy



Iris, Smithsonian's National Zoo  
Photo by Alexandra Reddy

## Future Plans

In future studies we plan to explore licker plugging further, both as an example of tool use, and as an indication that zoo-housed orangutans may enrich their own environment.

## References

- Lonsdorf, E. (2005). Sex differences in the development of termite-fishing skills in the wild chimpanzees, *Pan troglodytes schweinfurthii*, of Gombe National Park, Tanzania. - *Anim. Behav.* 70(3): 673-683.
- Reader, S.M. & Laland, K.N. (2001). Primate innovation: sex, age and social rank differences. - *Int. J. Primatol.* 22(5): 787-805.

## SURVEY PARTICIPANTS

ABQ Biopark, Audubon Institution, Brookfield Zoo, Cheyenne Mountain Zoo, Cincinnati Zoo, Cleveland Metroparks Zoo, Columbus Zoo, Como Park, Denver Zoo, Fort Wayne Children's Zoo, Fort Worth Zoo, Houston Zoo, Jackson Zoo, Little Rock Zoo, Los Angeles Zoo, Memphis Zoo, Oregon Zoo, Phoenix Zoo, Racine Zoo, Sedwick County Zoo, Smithsonian's National Zoo, Toledo Zoo, Topeka Zoo, Toronto Zoo, Utah's Hogle Zoo, Virginia Zoo, Zoo Miami, Zoo Atlanta



# Modern Conservation: The Red Siskin Initiative

Smithsonian Conservation Biology Institute, Front Royal, VA  
Erica Royer

## What is a Red siskin?



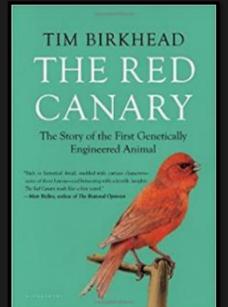
- *Spinus cucullatus*; small (10g) neotropical passerine known as “El Cardenalito”
- Endangered (IUCN)
- Historical range covered northern Venezuela
- In 2003, a population of a few hundred found in southeastern Guyana



## Why are they endangered?

- Unsustainable harvest for pet trade
- Hybridization with canaries in captivity and subsequent release
- Habitat loss and fragmentation
- Inbreeding

Private aviculturists have been hybridizing Red siskin and canaries since the early 1900s to produce Red canaries.



## What is the Red Siskin Initiative?

The Red Siskin Initiative is an international partnership of public, private institutions, communities, and people working to understand, protect, and restore sustainable populations of this iconic bird in Venezuela and Guyana.

## Ex-situ: Raising and Reintroducing

- Smithsonian Conservation Biology Institute - only AZA population of 6.8 Red siskin
- SCBI is developing breeding and husbandry protocols for VE zoos
- Building conservation breeding centers at VE zoos
- Working with private aviculturists



## In-situ: Understanding the Red siskin

- Monitoring population size and where they still occur
- Monitoring nest sites
- Collecting samples for genetic analyses
- Where does trapping still occur?
- Research of illicit online trade and regional trafficking
- Crop sampling for diet research
- Exchange of information between in-situ and ex-situ teams have been vital to the project.

## Genomics

- Conducting analyses at NMNH to assess hybridization in SCBI flock
- Recovery of DNA from museum specimens
- de novo assembly of reference genome complete

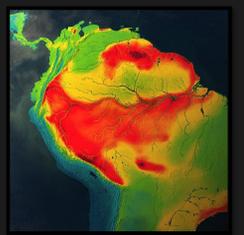
## Connecting with People

- Culturally iconic species
- Education focused breeding centers in VE
- Training for Guyanese customs and border agents in wildlife ID, monitoring, and reporting
- Fundraising opportunities with VE chocolatier



## Sustainable Agroforestry and Habitat Protection

- USFWS funding for Bird Friendly Coffee project
- Surveys of shade coffee farms seeking bird friendly coffee certification and sites with ecotourism activities for future release sites



## RSI Partners

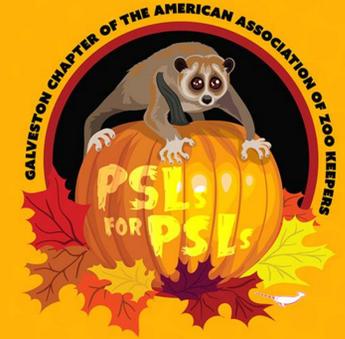




# PSLs for PSLs

## Conservation Through Community and Coffee

Sean Salinger  
Rainforest Biologist, Moody Gardens



### What is PSLs for PSLs?

- A partnership with a coffee shop, which donates a portion of every pumpkin spice latte sale.
- Ran from Oct. 1 – Jan. 8.
- Proceeds benefited the **Little Fireface Project**.
- Received **\$636** from Moody Gardens via coffee sales, plus about **\$100** from guest donations.

### Picking a Partner

The host for our pilot year was an easy choice: **Moody Brews**



- Pros:
  - On property (in Moody Gardens Hotel lobby).
  - Prominent location between front desk and convention center, with high volume during events and conferences.
  - Moody Brews was very generous, donating \$1 of every pumpkin spice latte sale. They also let us set up a small donation box near the cash register.
- Cons:
  - Target customers are businesspeople and conference-goers, so it is only open during regular business hours.

### Branding & Publicity

- Very fortunate to have a custom logo designed by **Peppermint Narwhal** (above) – it struck a nice balance of “responsibly cute.”
- Very little external publicity—mainly signs on property and social media posts from GCAAZK, Moody Gardens, and staff.
- Loris twins were born Dec. 16, so we plugged PSLs for PSLs in as much baby media as possible.

### Purpose & Inspiration

- The event was inspired simply by the coincidental monograms of some people’s autumn obsession (**Pumpkin Spice Lattes**) and our own keepers’ year-long obsession (**Pygmy Slow Lorises**).
- Slow lorises face the interesting dilemma of *overexposure*. We wanted to reframe that popularity in terms of conservation rather than clicks.
- The goal of PSLs for PSLs is to use the popularity of a seasonal staple to thrust pygmy slow lorises into the public consciousness—the right way.

Example of window cling.

### Education

Our Graphics Production Department helped create signage for the event:

- Basic event information in various locations around property.
- Signage in coffee shop and near our two pygmy slow loris exhibits:
  - Loris natural history information.
  - Conservation threats, emphasizing illegal animal trade.
  - What the **Little Fireface Project** does.
  - Ways to help lorises, emphasizing behavior and sharing on social media.
- Graphic content minimized to avoid “doom and gloom” messaging.



Example of baby lorises.

Example of window cling.

### In the Future

- Expand to other local coffee shops.
- Hold evening events with auction, raffle, and other activities.
- Possible ambassador animal appearances in hotel lobby.
- Scheduled slow loris keeper chats.
- Additional fundraising efforts:
  - Auction/raffle (in person/online)
  - Merchandise with fancy logo (mugs, coffee sleeves, etc.)
- Most importantly, *team up with other AAZK chapters!*

# International Outreach Committee

## Furthering Professional Education and Relationships Abroad

### IOC MISSION:

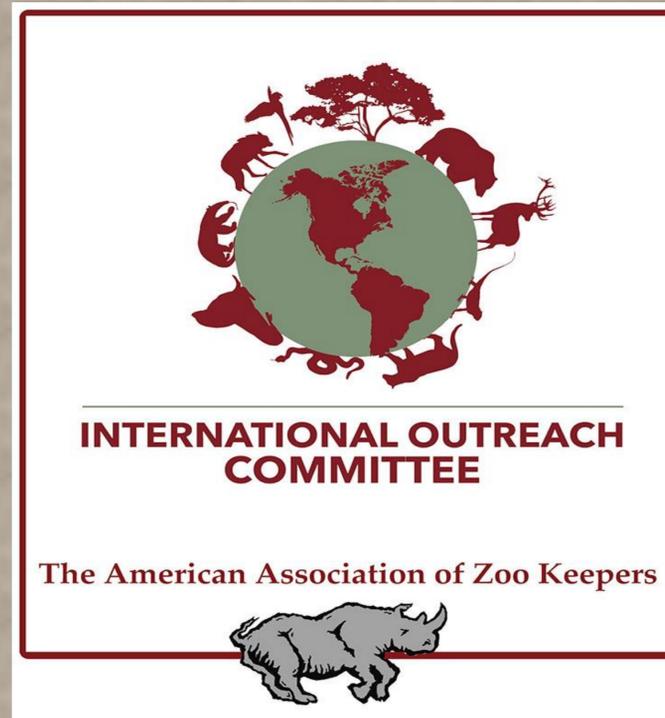
To provide training and educational opportunities for international animal care professionals in Latin American countries

### IOC VISION:

To offer resources to international animal care professionals, providing opportunities to improve animal well-being and to network with leaders in the field, while increasing knowledge of wildlife conservation efforts

### IOC PURPOSE:

To provide resources and opportunities for training and continuing education in the international community through AAZK professional development material, the AAZK Conservation Committee, and AAZK National Conferences



The International Outreach Committee (IOC) was formed in February of 2016 to provide assistance to international colleagues in Latin American countries



### IOC GOALS:

- Develop a professional relationship with Latin American zoos, aquariums, and animal facilities
- Provide assistance with professional development opportunities for animal care staff
- Assist with developing Keeper Associations

### IOC PROJECTS:

- Latin America Travel Grant to AAZK National Conference
- Teaching Courses for Animal Care Professionals
- Translating AAZK courses, workshops, and presentations into Spanish
- Partnering with International Congress of Zookeepers and keepers worldwide to improve animal care  
iczoo.org



# “The Wall” Bamboo Enrichment for our Hyacinth Macaw

Rick Smith , Zookeeper Bird Department smith@stlzoo.org



## Background

In 2016, an adjustable bamboo jungle gym nicknamed “the bamboo wall” was created for our breeding pair of Hyacinth Macaws (*Anodorhynchus hyacinthinus*). The female hyacinth has a history of climbing out of the habitat, through the piano wire, to get attention from visitors and staff. This created a visitor hazard. To remedy; we had to come up with some sort of progressively challenging enrichment to keep her occupied. I used the AZA “Action Planning Format” for my development of the (Bamboo) “wall” enrichment plan. I chose to target/encourage locomotive and foraging behaviors. The “wall” idea was “hatched” when I saw some bamboo scaffolding being used by construction workers in Asia on the news. I thought “what a great jungle gym”; for a bird to climb on. My plan was to build a similar jungle gym/wall of Bamboo that could easily be changed in shape and size.



## Discussion

A variety of enrichment items were put on the wall but I found that putting their diet in different places throughout the wall provided the best enrichment. In addition, the wall itself especially the honeysuckle was a top choice item for chewing. The results from using the “Bamboo Wall” increased the pair’s activity in the habitat and did reduce the female’s habit of climbing out. Although building the wall was time consuming, it proved to be an easy way for keepers to change enclosure furniture and offer many different enrichment choices for the birds. In addition, it was a great way for us to reduce the bamboo and honey suckle in the zoo. The habitat’s evolution from a stable environment to a constantly changing active display has helped our bird’s daily welfare.



## Methods

In the past the macaws were given bamboo as a browse but, they chewed very little of it. Bamboo was never really tried as a climbing object. By experimenting with bamboo poles I was able to determine how to proceed building a bamboo wall. The plan was to make the wall progressively more challenging to climb. The first step was to get the birds to climb vertically up a pole. This was done using a single pole wedged between the HVAC duct and substrate. There is no past record of these birds climbing vertically up any form of pole. Food rewards were placed low on the pole to make it attractive to climb. At first the birds climbing attempts were awkward. Within a few days the female had learned to climb. Each day food rewards were raised a little higher. After a little over a week she was at the top of the pole. Next the number of vertical poles were increased and within 3 weeks I had built the first bamboo wall.



## Anatomy of the Bamboo wall

The bamboo wall is a series of vertical bamboo poles that are wedged (or anchored) between the back ceiling/HVAC venting and substrate of the exhibit. These poles are connected or unconnected to one another. One can create alternative travel routes by adding horizontal poles connected to the main perching and vertical poles. Without the horizontal poles the wall can only be accessed from the substrate. The poles of varying diameters are set up in a row or positioned so that they make a more solid structure. Pole diameter affects the bird’s grip (i.e. a wide pole is more stable and easier to climb whereas the thinner poles will be less stable and flex when climbed on). Each bamboo pole can have its foliage attached or cut. If the foliage is left on the pole it will make it more challenging to the bird’s navigation because the foliage obstructs the bird’s climbing ability. The cut branch knobs can hold food rewards like banana pieces. The knobs can also hold the horizontal poles; making one pole more desirable to climb than the other offers the birds climbing choices. We can vary how much wall is put in daily for variety and depending on time available. On a busy work day we may use only 1-2 poles. On a day where we have more time we might create a more complex structure using 4-6+ poles (and connect them). Each day our birds have a unique opportunity for foraging and climbing. In addition to the bamboo wall we also add large honey suckle branches (with foliage) for browse and climbing. The honey suckle branches are moved around daily. Sometimes I place them strategically so that the bird’s climbing routes are obstructed complicating even more of the birds navigation. The birds seem prefer chewing honey suckle than the bamboo. The large honey suckle branches last for about one week. We remove the mutilated pieces of the old honey suckle and replace them with fresh honey suckle at least twice weekly.

## Conclusion

The bamboo wall has led us to a variety of enrichment opportunities for our hyacinth macaw pair. It provides an avenue to solve one of our more challenging problems at the bird house by keeping one of our smartest birds inside her habitat. In the end it turned out that the honey suckle was enough enrichment to keep the female from climbing out. We continue to use honey suckle as the birds climbing structure and browse. This is done at least twice weekly. The bamboo wall is still used on occasion. All of this enrichment is a very intense and time consuming project but the results are so fantastic that it makes the project well worth the time.

