Dear Friends and Supporters,

Greetings from Boston as we are welcoming a long-awaited Spring. Eid Mubarak to all those who celebrate, including most of our dedicated staff in Indonesia. Our team is getting some well-earned time off to visit with family and friends at this special time of year.

In this issue of *Code RED* we hear from our Environmental Education Manager, Widiya, about some of the recent activities of the 'Village Flower' group – a women's empowerment group in Rantau Panjang Village that provides support to women who had to end their formal education early due to social and/or economic circumstances. Women hold important roles in communities, and this group helps to ensure that women are equipped to help solve conservation related issues that impact themselves, their households, and their communities.

You will also hear from Dr. Caitlin O'Connell, our Deputy Director, about this year's congress of the American Association of Biological Anthropologists that took place in Baltimore, Maryland this month. We had a great presence at the conference, with Boston University undergraduates, graduate students, postdocs and alumni presenting a diverse body of work on orangutans in and around Gunung Palung. All of the presentations were well received and got great feedback.

Wishing you all peace and a wonderful springtime!

Sincerely,

Cheryl Knott

IN THIS ISSUE:

Join Save Wild Orangutans

DONATE

WE STILL NEED YOUR HELP! With federal funding still frozen and the future of federal grants uncertain, any amount you can donate will help us to ensure...

1. All our local staff can get paid.

2. We can continue forest patrolling, preventing logging, hunting, and fires.

3. We can secure legal protection of another 6,000 hectares of forest.

Cheryl Knott, PhD
Executive Director
Gunung Palung Orangutan Conservation Program (GPOCP)

4. We can keep monitoring the health of the orangutan population.

Donate
at SaveWildOrangutans.org today!

Empowering Women Through Ecoprint Training in Rantau Panjang Village

By Widiya Octa Selfiany, Environmental Education Manager

We continue to strengthen our mission through environmental education and community empowerment by supporting the "Kembang Desa" (Village Flower) group, a women's organization in Rantau Panjang Village, one of the Village Forest areas that we support. In collaboration with the Gunung Palung National Park Office (TANAGUPA), we organized an Ecoprint Training Workshop.

Ecoprinting is an eco-friendly art technique that uses natural plant materials to create unique, nature-inspired prints on fabric. This training, held under the theme "Learning While Working" in honor of National Waste Awareness Day, aimed to foster creativity while promoting sustainability.

The group of participants getting started on their ecoprints.

The workshop featured speakers from TANAGUPA, including Mrs. Fadlun Arrayyan Bonde, S.I.P, Mrs. Pujiastuti, and Mr. Yadi, along with Mrs. Widiya Octa Selfiany from Yayasan Palung. A total of 18 enthusiastic participants from the Kembang Desa group joined the training, eager to learn this environmentally friendly technique.

During the session, participants were guided through the step-by-step process of ecoprinting, from selecting natural materials and preparing fabrics to applying plant-based dyes and using steaming or pounding techniques to transfer leaf and flower patterns onto textiles. The result? Beautiful, one-of-a-kind fabrics created using locally available materials from their own environment.

Displaying the finished ecoprints.

According to Widiya Octa Selfiany, our Environmental Education Manager, this initiative goes beyond skill-building—it aligns with the broader conservation effort.

“By using natural materials, we not only promote creativity but also help reduce textile waste and encourage more sustainable production methods,” she explained.

Beyond fostering artistic skills, this training also holds economic potential. With their newfound expertise, participants can create and sell ecoprint products, offering them a sustainable source of income while promoting environmentally friendly craftsmanship.

The Kumbang Desa group listens intently.

Understanding the Connection Between Forests and Water

The commitment to environmental education didn't stop there. On Sunday, March 9, 2025, the Kembang Desa group participated in another capacity-building program focused on environmental conservation. This event, held at the Rantau Panjang Village Office, was organized to commemorate International Forest Day (March 21) and World Water Day (March 22).

During the "Forest and Water Education" session, Mrs. Sela Darmayati, our Environmental Education Assistant Field Officer, led an engaging discussion on the importance of forest conservation and its direct impact on water resources. Participants learned how forests regulate the water cycle, prevent floods and droughts, and sustain biodiversity—all essential for maintaining ecological balance and human well-being.

Hands-On Training in Composting and Tree Planting

The participants also took part in practical training on composting and planting media preparation, led by Mrs. Anggie, a member of the Kembang Desa group. They learned how to convert cow manure into high-quality organic fertilizer and create optimal planting media to support healthy plant growth.

Following the training, the group put their knowledge into action by participating in a tree planting activity in front of the Rantau Panjang Village Office. Each participant planted a tree, reinforcing their commitment to environmental conservation.

Top: Discussing how to create organic fertilizer. Bottom: Tree planting in Rantau Panjang.

Promoting Local Products and Sustainable Business Opportunities

The event concluded with an exhibition of local products made by members of the Kembang Desa group. Participants showcased coconut and anchovy shredded fish-based products (known in Indonesia as 'abon'), highlighting the potential of local resources in creating sustainable business opportunities.

Through these initiatives, we hope to inspire greater environmental awareness, promote creative sustainability, and empower communities to develop eco-friendly economic opportunities. By combining education, conservation, and entrepreneurship, these programs are helping build a greener, more self-sufficient future for the people of Rantau Panjang Village.

Kumbang Desa Group photo.

Orangutans of GPOCP featured prominently at the 2025 AABA meeting in Baltimore

By Caitlin O'Connell, Deputy Director

Every year, the American Association of Biological Anthropologists (AABA) convenes to bring together scholars of human biology, human evolution, skeletal anatomy, genetics, and primatology. It gives researchers of these diverse subfields a chance to hear from one another about their latest findings and come up with the research questions that will drive the scientific work of tomorrow. Colleagues from all over the world get a chance to reconnect and build new partnerships. This March, the Gunung Palung Orangutan Conservation Program (GPOCP) was honored to participate in the annual meeting hosted in Baltimore, Maryland. Our team, including staff members as well as Boston University undergraduate and graduate students, contributed **nine** insightful presentations, showcasing cutting-edge research on Bornean orangutans (*Pongo pygmaeus wurmbii*) from Gunung Palung National Park and surrounding areas.

Reconnecting with colleagues at AABA. Top: Boston University Anthropology faculty, students, and alumni gather for dinner. Bottom: Cheryl with her old friends from graduate school, Drs. Rick Bribiescas and Grazyna Jasienska.

Each of the Gunung Palung-related studies shed light on different aspects of orangutan behavior, ecology, conservation, and the innovative research methods being used to protect these critically endangered primates. We share with you a summary of our team's contributions:

Understanding Orangutan Behavior and Physiology

Habituation and Energetic Costs
Laura Brubaker-Wittman, PhD student at Boston University, explored how wild orangutans respond to human observers during habituation. Her research found that flanged males are more likely to vocalize/give threat alarms while females are more likely to hide. When food is more readily available unhabituated orangutans in general are more likely to flee than hide. These findings highlight the complex social and energetic factors influencing orangutan behavior.

Laura Brubaker-Wittman

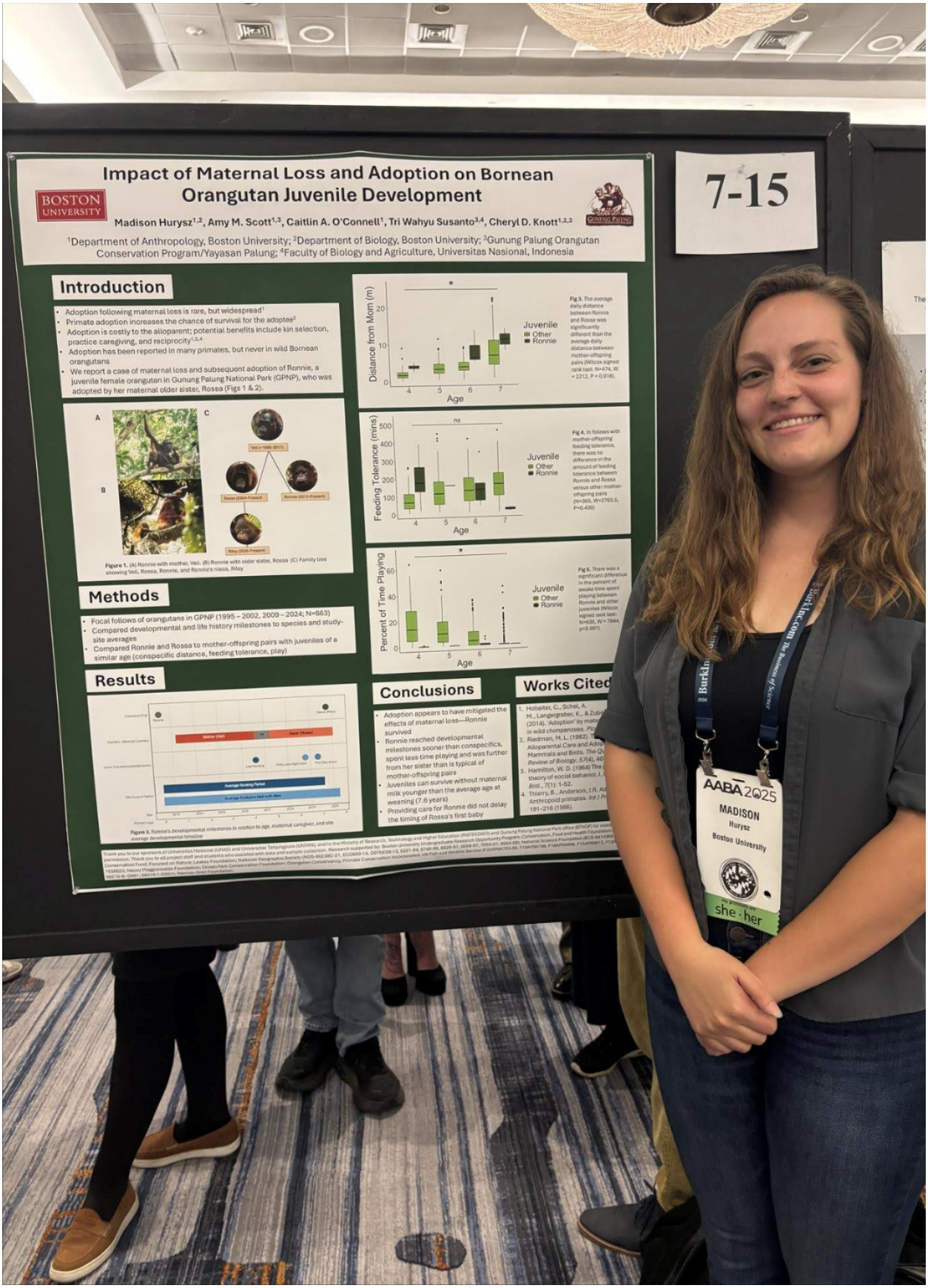
Muscle Mass and Male Morphs
Dr. Faye Harwell, a former PhD student at Boston University, examined differences in **lean body mass** between wild and captive orangutans, revealing that flanged males have significantly more muscle than unflanged males. This difference reflects their unique reproductive strategies, with flanged males investing more in muscle growth. Interestingly, this pattern was not observed in captivity or in previous studies, emphasizing the role of ecological conditions in shaping orangutan physiology.

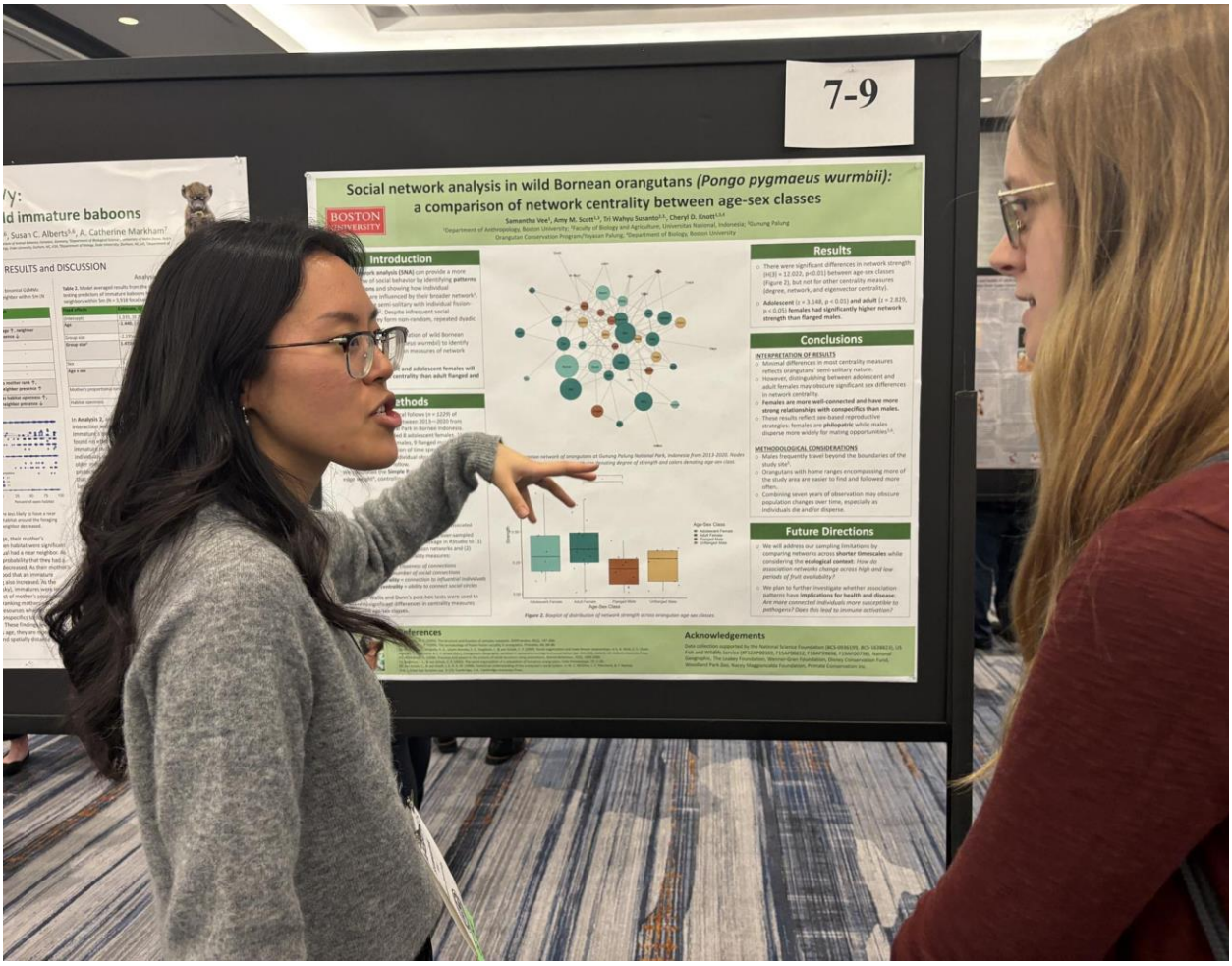
Dr. Faye Harwell

Maternal Loss and Adoption
Madison Hurysz, a recent undergraduate student at Boston University, presented a rare case of **orangutan adoption** following maternal loss. A young female, Ronnie, was cared for by her older sister after their mother disappeared. While Ronnie developed independence earlier than

typical, the adoption helped mitigate the negative impacts of maternal loss, showing the resilience and adaptability of orangutan social bonds.

Social Networks in Orangutans
Samantha Vee, PhD student at Boston University, used **social network analysis** to investigate orangutan social relationships. She found that females, especially adolescents and adults, are more socially connected than flanged males. This reflects differences in reproductive strategies, with females remaining in their natal areas while males disperse.


7-15
Impact of Maternal Loss and Adoption on Bornean Orangutan Juvenile Development
BOSTON UNIVERSITY
Madison Hurysz[1,2], Amy M. Scott[1,3], Caitlin A. O'Connell[1], Tri Wahyu Susanto[3,4], Cheryl D. Knott[1,2,3]
[1]Department of Anthropology, Boston University; [2]Department of Biology, Boston University; [3]Gunung Palung Orangutan Conservation Program/Yayasan Palung; [4]Faculty of Biology and Agriculture, Universitas Nasional, Indonesia
Introduction
Adoption following maternal loss is rare, but widespread[1]
Primate adoption increases the chance of survival for the adoptee[2]
Adoption is costly to the alloparent; potential benefits include kin selection, practice caregiving, and reciprocity[1,3,4]
Adoption has been reported in many primates, but never in wild Bornean orangutans
We report a case of maternal loss and subsequent adoption of Ronnie, a juvenile female orangutan in Gunung Palung National Park (GPNP), who was adopted by her maternal older sister, Rossa (Figs 1 & 2).
Figure 1. (A) Ronnie with mother, Vali. (B) Ronnie with older sister, Rossa (C) Family tree showing Vali, Rossa, Ronnie, and Ronnie's niece, Riley
Methods
Focal follows of orangutans in GPNP (1995 – 2002, 2009 – 2024; N=863)
Compared developmental and life history milestones to species and study-site averages
Compared Ronnie and Rossa to mother-offspring pairs with juveniles of a similar age (conspecific distance, feeding tolerance, play)
Results
Figure 2. Ronnie's developmental milestones in relation to age, maternal caregiver, and site average developmental timeline
Distance from Mom (m)
Age
Juvenile
Other
Ronnie
Fig 3. The average daily distance between Ronnie and Rossa was significantly different than the average daily distance between mother-offspring pairs (Wilcox signed rank test: N=474, W = 2212, P = 0.018).
Feeding Tolerance (mins)
ns
Fig 4. In follows with mother-offspring feeding tolerance, there was no difference in the amount of feeding tolerance between Ronnie and Rossa versus other mother-offspring pairs (N=365, W=2765.5, P=0.430)
Percent of Time Playing
Fig 5. There was a significant difference in the percent of awake time spent playing between Ronnie and other juveniles (Wilcox signed rank test, N=635, W = 7644, p<0.001)
Conclusions
Adoption appears to have mitigated the effects of maternal loss—Ronnie survived
Ronnie reached developmental milestones sooner than conspecifics, spent less time playing and was further from her sister than is typical of mother-offspring pairs
Juveniles can survive without maternal milk younger than the average age at weaning (7.5 years)
Providing care for Ronnie did not delay the timing of Rossa's first baby
Works Cited
AABA 2025
MADISON
Hurysz
Boston University
she · her



Top: Madison Hurysz with her poster. Bottom: Samantha Vee explains her findings.

Conservation and Habitat Protection

Orangutan Density in Village Forests
Dr. Caitlin O'Connell examined **orangutan populations in community-managed Village Forests**, showing that areas bordering Gunung Palung National Park support higher densities than those near logging concessions. Recent deforestation has also been associated with an increase in orangutan density and a surge in human-orangutan interactions in the area. This research underscores the importance of community-led conservation initiatives in maintaining orangutan populations and the impact of deforestation on orangutans.

The Power of Environmental Education
Natalie Robinson, former BU undergraduate and GPOCP Project Coordinator, assessed the impact of our **environmental education programs** on students in West Kalimantan. Data from nearly 4,300 students revealed significant increases in knowledge and positive attitudes toward orangutan conservation. However, many students remained uncertain about their ability to create change, highlighting the need for programs that foster empowerment.


GUNUNG PALUNG
Variation in Orangutan Density Across Community Managed Village Forests
Caitlin A. O'Connell[1], Beth Barrow[1], Edi Rahman[1], Erik Sulidra[1], Hendri Gunawan[1], Robi Kasianus[1], Gunawan Wibisono[1], Amy M. Scott[1,2], Tri Wahyu Susanto[1,2] and Cheryl D. Knott[1,3,4]
incredibly hard working Indonesian team on the ground. They
here and then a lot of the data wrangling has happened
MARRIOTT

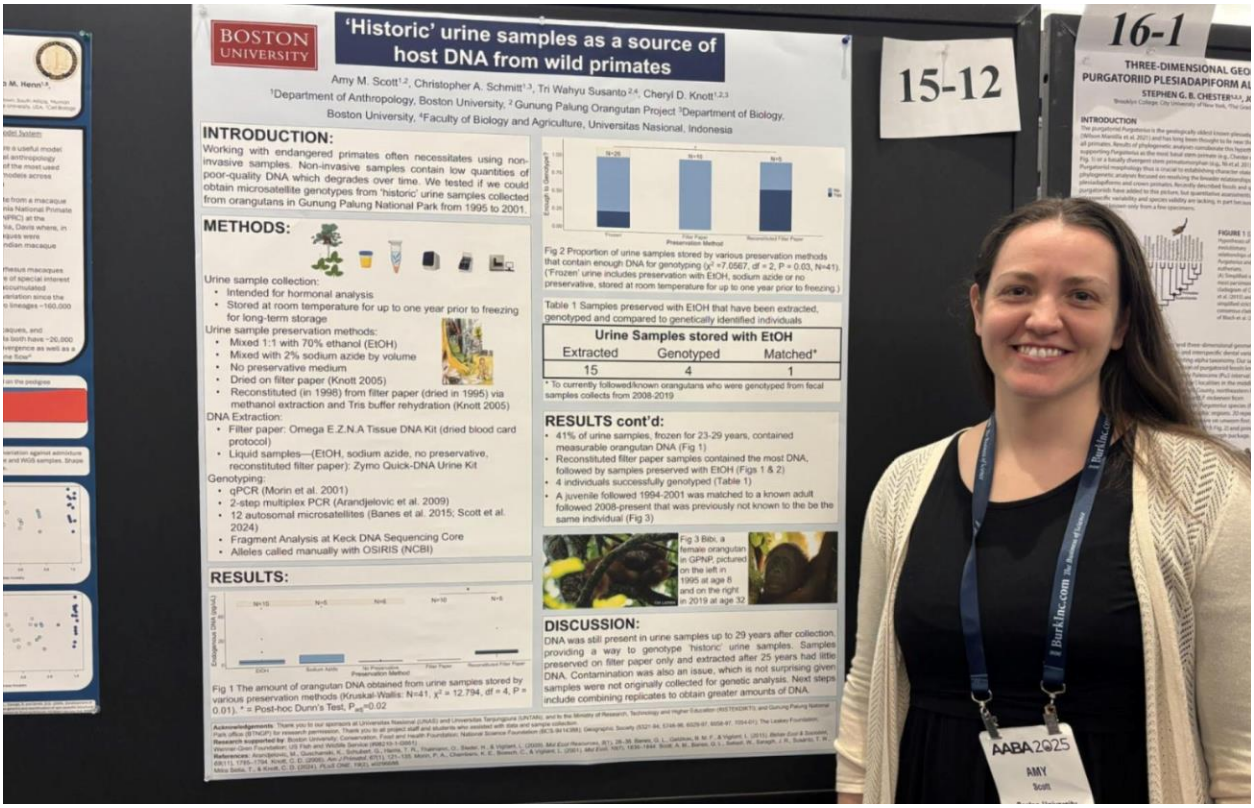
Top: Dr. Caitlin O'Connell; Bottom: Natalie Robinson

Innovative Research Methods

Historic Urine Samples and Genetics
Dr. Amy Scott, post-doc and former PhD student at Boston University, demonstrated that **historic orangutan urine samples** collected over 20 years ago can still yield usable DNA! This opens exciting new possibilities for tracking individual orangutans over time, even when long gaps exist in field data.

Acoustic Monitoring for Conservation
Francis Short, PhD Student at Boston University, applied **passive acoustic monitoring** (PAM) and machine learning to detect three endangered primates in Gunung Palung. His results confirmed that orangutans prefer peat swamp forests, while other species respond to changes in vegetation and elevation. This research highlights the potential of AI-powered monitoring for conservation.

AI and Orangutan Locomotion
Ritika Sibal, current Master's student at Boston University, used **computer vision** to compare the way orangutans and chimpanzees walk on the ground. Her AI model accurately tracked joint movements, revealing key differences in knee extension between the two species. This research contributes to our understanding of ape locomotion and the evolution of bipedalism.


BOSTON UNIVERSITY
'Historic' urine samples as a source of host DNA from wild primates
Amy M. Scott[1,2], Christopher A. Schmitt[1,3], Tri Wahyu Susanto[2,4], Cheryl D. Knott[1,2,3]
[1]Department of Anthropology, Boston University, [2] Gunung Palung Orangutan Project [3]Department of Biology, Boston University, [4]Faculty of Biology and Agriculture, Universitas Nasional, Indonesia
INTRODUCTION:
Working with endangered primates often necessitates using non-invasive samples. Non-invasive samples contain low quantities of poor-quality DNA which degrades over time. We tested if we could obtain microsatellite genotypes from 'historic' urine samples collected from orangutans in Gunung Palung National Park from 1995 to 2001.
METHODS:
Urine sample collection:
Intended for hormonal analysis
Stored at room temperature for up to one year prior to freezing for long-term storage
Urine sample preservation methods:
Mixed 1:1 with 70% ethanol (EtOH)
Mixed with 2% sodium azide by volume
No preservative medium
Dried on filter paper (Knott 2005)
Reconstituted (in 1998) from filter paper (dried in 1995) via methanol extraction and Tris buffer rehydration (Knott 2005)
DNA Extraction:
Filter paper: Omega E.Z.N.A Tissue DNA Kit (dried blood card protocol)
Liquid samples—(EtOH, sodium azide, no preservative, reconstituted filter paper): Zymo Quick-DNA Urine Kit
Genotyping:
qPCR (Morin et al. 2001)
2-step multiplex PCR (Arandjelovic et al. 2009)
12 autosomal microsatellites (Banes et al. 2015; Scott et al. 2024)
Fragment Analysis at Keck DNA Sequencing Core
Alleles called manually with OSIRIS (NCBI)
RESULTS:
Fig 1 The amount of orangutan DNA obtained from urine samples stored by various preservation methods (Kruskal-Wallis: N=41, χ^2 = 12.794, df = 4, P = 0.01). * = Post-hoc Dunn's Test, P_{adj}=0.02
Fig 2 Proportion of urine samples stored by various preservation methods that contain enough DNA for genotyping (χ^2 =7.0567, df = 2, P = 0.03, N=41). ('Frozen' urine includes preservation with EtOH, sodium azide or no preservative, stored at room temperature for up to one year prior to freezing.)
Table 1 Samples preserved with EtOH that have been extracted, genotyped and compared to genetically identified individuals
Urine Samples stored with EtOH
Extracted 15
Genotyped 4
Matched* 1
* To currently followed/known orangutans who were genotyped from fecal samples collects from 2008-2019
RESULTS cont'd:
41% of urine samples, frozen for 23-29 years, contained measurable orangutan DNA (Fig 1)
Reconstituted filter paper samples contained the most DNA, followed by samples preserved with EtOH (Figs 1 & 2)
4 individuals successfully genotyped (Table 1)
A juvenile followed 1994-2001 was matched to a known adult followed 2008-present that was previously not known to the be the same individual (Fig 3)
Fig 3 Bex, a female orangutan in GPNP, pictured on the left in 1995 at age 6 and on the right in 2019 at age 32
DISCUSSION:
DNA was still present in urine samples up to 29 years after collection, providing a way to genotype historic urine samples. Samples preserved on filter paper only and extracted after 25 years had little DNA. Contamination was also an issue, which is not surprising given samples were not originally collected for genetic analysis. Next steps include combining replicates to obtain greater amounts of DNA.
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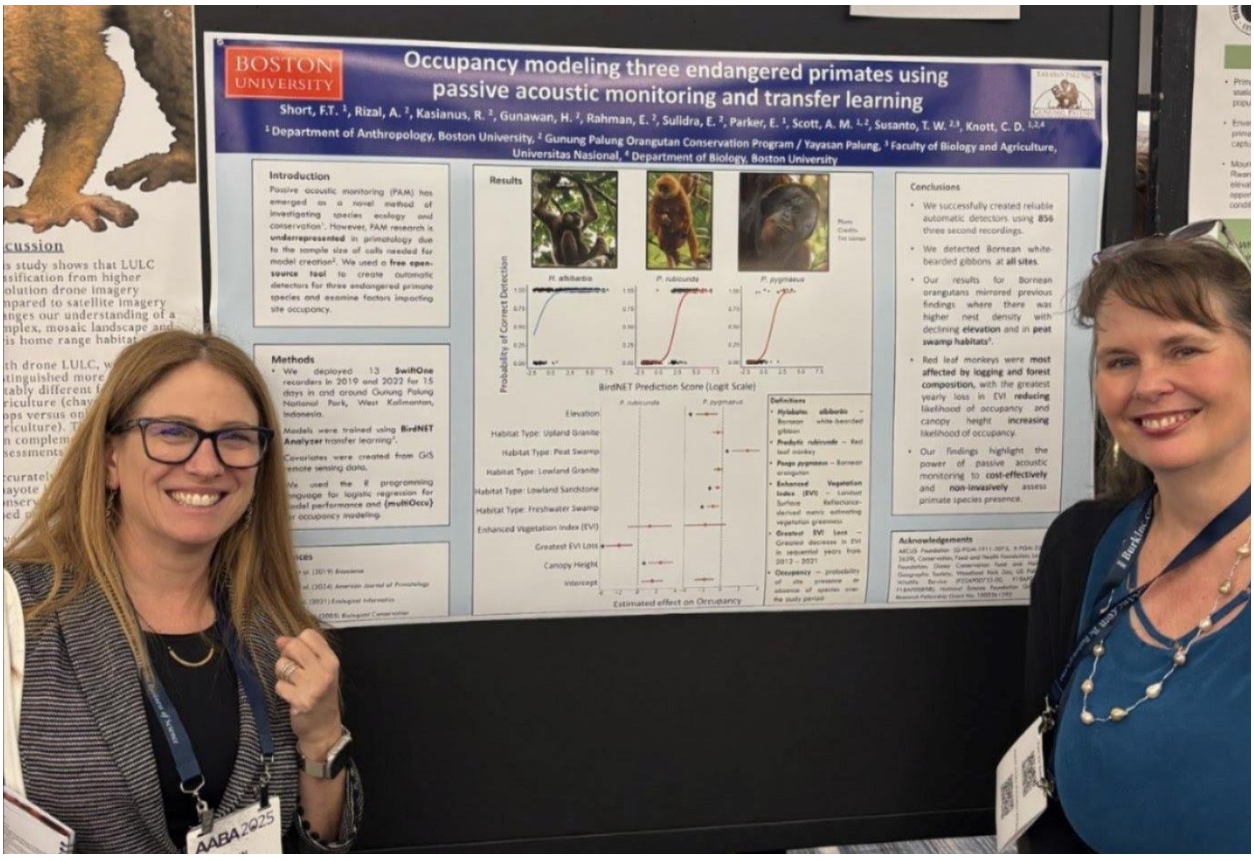
BOSTON UNIVERSITY
Occupancy modeling three endangered primates using passive acoustic monitoring and transfer learning
Short, F.T. [1], Rizal, A. [2], Kasianus, R. [2], Gunawan, H. [2], Rahman, E. [2], Sulidra, E. [2], Parker, E. [1], Scott, A. M. [1,2], Susanto, T. W. [2,3], Knott, C. D. [1,2,4]
[1] Department of Anthropology, Boston University, [2] Gunung Palung Orangutan Conservation Program / Yayasan Palung, [3] Faculty of Biology and Agriculture, Universitas Nasional, [4] Department of Biology, Boston University
Introduction
Passive acoustic monitoring (PAM) has emerged as a novel method of investigating species ecology and conservation[1]. However, PAM research is underrepresented in primatology due to the sample size of calls needed for model creation[2]. We used a free open-source tool to create automatic detectors for three endangered primate species and examine factors impacting site occupancy.
Methods
We deployed 13 SwiftOne recorders in 2019 and 2022 for 15 days in and around Gunung Palung National Park, West Kalimantan, Indonesia.
Models were trained using BirdNET Analyzer transfer learning[3].
Covariates were created from GIS & remote sensing data.
We used the R programming language for logistic regression for model performance and (multiOcc) for occupancy modeling.
Results
H. albibarbis
P. rubicunda
P. pygmaeus
Probability of Correct Detection
BirdNET Prediction Score (Logit Scale)
Habitat Type: Upland Granite
Habitat Type: Peat Swamp
Habitat Type: Lowland Granite
Habitat Type: Lowland Sandstone
Habitat Type: Freshwater Swamp
Enhanced Vegetation Index (EVI)
Greatest EVI Loss
Canopy Height
Intercept
Estimated effect on Occupancy
Definitions
Hylobates albibarbis – Bornean white-bearded gibbon
Predytis rubicunda – Red leaf monkey
Pongo pygmaeus – Bornean orangutan
Enhanced Vegetation Index (EVI) – Landsat surface reflectance-derived metric estimating vegetation greenness
Greatest EVI Loss – Greatest decrease in EVI in sequential years from 2012 – 2021
Occupancy – probability of site presence or absence of species over the study period
Conclusions
We successfully created reliable automatic detectors using 856 three second recordings.
We detected Bornean white-bearded gibbons at all sites.
Our results for Bornean orangutans mirrored previous findings where there was higher nest density with declining elevation and in peat swamp habitats[4].
Red leaf monkeys were most affected by logging and forest composition, with the greatest yearly loss in EVI reducing likelihood of occupancy and canopy height increasing likelihood of occupancy.
Our findings highlight the power of passive acoustic monitoring to cost-effectively and non-invasively assess primate species presence.
Acknowledgements
AABA2025

Top: Dr. Amy Scott; Center: Dr. Erin Vogel and Dr. Cheryl Knott pose with Frank Short's poster (Frank is currently in the field in Indonesia!) Bottom: Ritika Sibal

Looking Ahead

The AABA conference was an incredible opportunity to share our work, engage with the scientific community, reconnect with colleagues, and gain valuable insights into new research. The diversity of studies presented underscores the complexity of orangutan ecology and the importance of multi-faceted conservation strategies. We are eager to see all of these presenters continue their work and offer fresh perspectives that we all can learn from.

We are grateful to our dedicated research team, student members of the Knott lab at BU, expert conservation staff, community partners, and supporters who make this work possible. Together, we continue our mission to protect the orangutans of Gunung Palung National Park and inspire future generations to join the fight for scientific research and conservation.

The funders of this diverse body of work include US Fish & Wildlife Service, National Science Foundation, Arcus Foundation, Conservation, Food & Health, Woodland Park Zoo, Ocean Park Conservation Fund, Environmental Investigation Agency, National Geographic, Disney Conservation Fund, Leakey Foundation, Fulbright, Wenner-Gren, Nacey-Maggioncalda, Boston University UROP, Binnacle Fund of the Tides Foundation.

Management of Cabang Panti Research Station is conducted by the Gunung Palung National Park Office (BTN-GP) in collaboration with GPOCP/YP. Scientific research is carried out in conjunction with the Faculty of Biology at Universitas Nasional (UNAS) and Boston University.

"He who plants a tree, plants a hope."
- Lucy Larcom

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