Student Sustainability Council Meeting

16, January 2016

Present: Aaron Stromberg, William Varney, Richard Grewelle, Preston French, Noah Abercrombie, Hannah Penn, Jerrod Penn, Ellen Green, Gabriel Smith, Johnathan Elliot, Jennifer Taylor, Caroline Engle, Lauren Thomas, Danielle Empson, Sadie Meyer, Elizabeth Peneva, Michaela Rogers, Shane Tedder, Karina Fuentes

Guests: Stratton Hatfield

Absent: Sam Stromberg, Tina West,

12:43 – Danielle Begins meeting with introductions.

12:46 – Reading of the preamble

12:48 – Financial Update a given by Shane Tedder

12:55 – Discussion on financial statuses and unencumbering of funds approved within inactive projects

13:01- Voting on unencumbering the inactive projects funding, totaling some $20,000 for reallocation by the SSC

Vote: Yes: 18 No: 0

13:08 – Presentation Begins with Stratton presenting his Marshall Eagle research project

13:32 – Presentation concludes

13:32 – Q&A session begins

13:42 – Q&A ends

13:43 – Second presentation begins, recycling bin proposal given by Shane Tedder

13:50 – Q&A Begins

13:56 - Q&A ends

13:57 – Third presentation given by Shane Tedder on the continuation of the internship fee proposal begins

14:00 – Presentation Ends

14:01 – Q&A begins

14:03 – Q&A Ends

14:03 – Discussion on Marshall Eagle Proposal Begins

14:13 – Motion to extend discussion on first proposal (William, Aaron 2nd)

14:15 – Motion to vote on first proposal (William, Richard 2nd)

Vote Yes: 18 No: 0

14:16 – Discussion on recycling bin begins

14:24 – Motion to amend proposal (Danielle, Michaela 2nd)

Vote Yes: 18 No: 0

Amendment: The outreach committee within the SSC will be responsible for creating signage to be applied to the thirteen new recycling bins, with the possibility of a total update of signage on recycling bins across campus.

14:25 – Motion to vote on Amendment (Danielle, Aaron 2nd)

Vote Yes: 18 No: 0

14:26 – Motion to vote on Second proposal as amended (Ellen, Aaron 2nd)

Vote Yes: 17 No: 0 Abstain: 1

14:27 – Discussion on Third Proposal Begins.

14:34 – Motion to amend third proposal (Danielle, Aaron 2nd)

Vote Yes: 18 No: 0

Amendment: Mandatory presentation to be given by the sustainability interns to the Student Sustainability Council at the first SSC meeting of the Spring Semester.

14:36 - Motion to extend by two minutes (Danielle, Michaela 2nd)

14:38 – Motion to extend discussion by two minutes (William, Michaela 2nd)

14:41 - Motion to vote on third proposal as amended (William, Preston 2nd)

Vote Yes: 17 No: 0 Abstain: 1

University of Kentucky Student Sustainability Council
2015-2016 Grant Application

1. **Name:** Stratton Hatfield
2. **Email:** stratton.hatfield@uky.edu
3. **UK Affiliation:** Graduate Student, Department of Forestry
4. **Proposed Project Title:** The ecology of the Martial Eagle in the Maasai Mara region of Southern Kenya
5. **If applicable, please provide the sponsoring or overseeing organization. (e.g. the Office of Sustainability, Wildcat Wheels, the Dept. of Ag. Economics, etc.):** the Dept. of Forestry
6. **Total Amount Requested from the Council:** $6500.00
7. **Would you like to make a presentation to the Council before your proposal is reviewed?** Yes and I would be happy to drive to Raven Run to do this.

8. **Please mark the primary and secondary focus areas of your project with a 1 and 2, respectively.**

- Recycling:
- Transportation:
- Agriculture/Gardening:
- Water:
- Renewable Energy/ Energy Conservation:
- Climate Change:
- Local Environment:
- Behavioral Change:
- Species Diversity/Conservation: 1
- Other (Please Describe): 2 (Conservation Education)

9. **Please name any other project leaders:**

Name: Dr. John Cox

Title & Department: Assistant Professor of Wildlife and Conservation Biology (the Dept. of Forestry)

Project Role: Project Advisor

Email: jjcox@uky.edu

Name: Dr. Munir Virani

Title & Department: Africa Programs Director (The Peregrine Fund)

Project Role: Project Advisor

Email: tpf@africaonline.co.ke

Please note that any project leaders listed will be excused for closed discussion of their project proposal.

10. **Please describe the project, its goals, and how it contributes to UK student knowledge, attitudes & culture, or practices of the 3 pillars of sustainability (i.e. economic, environmental and social), including potential long term effects.**

Apex (top) predators are critical components of ecosystems and their loss can result in trophic cascades (Estes et al. 2011). Globally, apex predators including large wild cats and dogs, bears, raptors and sharks are declining,

and many species are endangered or threatened (Estes et al. 2011). Much less conservation attention has been focused on aerial predators such as raptors, particularly those that inhabit areas outside the U.S.

The Martial Eagle is the largest species of eagle in Africa and is an important apex predator of several different ecosystems, but particularly grassland and savanna. Martial eagles are listed as vulnerable by the IUCN and are in population decline throughout their range (Birdlife International 2013). Little is known about the basic ecology of the Martial Eagle and there is an urgent need to fill this knowledge gap in order to better understand and prevent further population declines. The Maasai Mara ecosystem in Southern Kenya is a conservation area that has a significant, but largely unknown population of this species. This proposed research project would seek to study the ecology of the Martial Eagle in the Maasai Mara. The specific objectives of this project include assessing the species' diet, estimating its home range size, characterizing its nesting locations and understanding its habitat use. A unique team of highly skilled and experienced collaborators has been assembled to carry out this project and ensure its success. This project would constitute the first Martial Eagle study to have been conducted in East Africa in over fifteen years and would provide essential ecological information that is required to adequately inform this species' conservation.

In addition to the aforementioned direct conservation benefits that this research project would provide it is also my goal to use this project as a vector for sharing applied conservation biology lessons from East Africa with University of Kentucky students. In questions 13 and 14 of this application you will find detailed information highlighting how I aim to achieve this. Since I began my undergraduate degree at the University of Kentucky I have had a growing desire to share with students current conservation work that is being conducted in Kenya. This project and the SSC's support will provide me with a platform to share this information.

11. **Name any anticipated project affiliates and describe the extent of their support, including any financial, matching or in-kind support. Specific details are encouraged.**

Dr. John Cox's research lab has kindly provided this project with $25,000 that we will use to purchase GPS GSM transmitters for 12 adult Martial eagles. These transmitters cost approximately $2000 and will be custom built in the Netherlands. They will provide us with a unique insight into this species movements. The Peregrine Fund are the "Global Experts" in raptor conservation and have agreed to partner on this project by providing their technical expertise. They are not currently providing any financial contributions to this project. The University of

Kentucky College of Agriculture has agreed to launch a crowd funding campaign for this project this spring semester where we hope to raise $10,000.00 over the course of this calendar year (2016) that will be put towards this project. Finally, the African Impact Mara Project located in Kenya in the Maasai Mara has agreed to provide accommodation and meals for myself during my field work.

12. Please mark the primary target population of your project

- UK (general):
- Undergraduates: Primary Target
- Graduates:
- Community:
- Faculty:
- Other (Please Describe):

In 250 words or less, please answer the following questions.

13. Describe the intended University of Kentucky audiences and potential number of people impacted including any potential diverse segments such as student or community organizations and supporting evidence (e.g. expected or historical event/speaker attendance).

This research project will be integrated into the syllabus of two University of Kentucky forestry classes (FOR 101 (Intro to Wildlife Conservation) and FOR 230 (Conservation Biology) with a typical combined enrollment of ~ 100 students (based on fall 2015). Dr. John Cox is the primary instructor for both of these classes. We will engage students primarily through the use of internet video technologies that will be incorporated into course lessons that focus on the Serengeti-Mara ecosystem and 3 topical learning areas: 1) principles of wildlife research and monitoring, 2) human dimensions in wildlife, and 3) graduate studies in the wildlife profession. Video links will include Skype sessions illustrating me conducting fieldwork (e.g. capture and immobilization, radio-tracking, trail camera set-up), one or more question and answer Skype sessions with a Masaai scout, direct links to project camera traps that will be collecting dietary and breeding data, and direct links to websites that will have a subset of our radio-transmitter data stored. Students would have access to select amounts of data that could be used during either class or lab sessions for class activities (e.g. calculating home range size of an eagle, understanding the relationship between animal location and environmental components).

Outreach includes a College of Ag magazine article (thousands of readers), one or more campus seminars (~ 100 or more students and faculty), presentation at state Audubon society chapter meeting, and state and national meetings of The Wildlife Society, and Society for Conservation Biology (hundreds of professionals).

14. Are there any students involved in the proposed project? If so, do they benefit from professional or technical skills, outputs, or experiences such as presentations, posters, or reports?

As a Masters student at the University of Kentucky I am involved in this project directly as the principle investigator. Unfortunately, due to research permits in Kenya, I will be the only University of Kentucky student

working in the field. There will be an additional research assistant (scout) that will be hired from the local Maasai community.

15. Please describe any previous history and to what extent you, other project leaders, or the sponsoring organization may have with the UK Student Sustainability Council.

I served as the Director of Operations for the UK SSC during my senior year (2012 – 2013).

16. **Please outline a timeline and milestones to ensure project efficacy prior to and after project implementation**.

Activity	Start Date	End Date
Permit Applications and Grant Submissions	December 2015	May 2016
Field Season in Kenya	June 2016	November 2016
GPS Transmitter Data Collection	June/July 2016	June/July 2018
Data Analysis/Thesis/Papers	November 2016	June/July 2018
Complete Project and Publish	June/July 2018	December 2018

17. Does the success of your project require prior approval of other UK or non-UK entities (e.g. IRB or venue approval, etc.)? If so, please provide supporting documentation.

Yes this project requires approval from the Narok County Council in Kenya to conduct this research in the Maasai Mara Ecosystem. Dr. Munir Virani has an MOU with them and has been given approval to lead a Martial Eagle research project. Dr. Munir Virani has been working in India remotely for the last two months and I have been unable to obtain a copy of this permit. Upon receipt of these permits I will make them available to the SSC. We will also be required to obtain permission to capture martial eagles from the UK Institutional Animal Care and Use Committee.

18. Please demonstrate how the Student Sustainability Council will be credited or advertised in your project (this can include promotional material). Would a project leader be available for a radio interview?

The UK SSC will become an official affiliate of the Maasai Mara Martial Eagle Project and their logo will be included in our project reports and when applicable on our Facebook page posts. In any peer reviewed publications that this project publishes the UK SSC will be mentioned in the acknowledgements. In FOR 101 and

FOR 230 it will be made clear to students that part of this project is funded through the SSC. If this project progresses as planned and individual birds are named I would be open to naming one of the eagles "the SSC bird" or any other requested name. This bird could be used as a conservation mascot for the SSC. In addition the SSC will receive monthly updates during our field season and could use these updates for publicity purposes. I would be available for a Radio Interview.

It is important to note that this project is located in one of the most spectacular wildlife viewing areas in the world. Projects in the Maasai Mara are often high profile and given media attention. Recently Dr. Munir Virani's work on vultures in this ecosystem was featured in the National Geographic magazine. As and when these opportunities arise I will inform the leadership of the UK SSC and coordinate how and where to give the UK SSC appropriate credit.

19. Using the following format, please provide a line item budget for the total amount request and what percent of the project is being sponsored by SSC funding. Provide information sources or reasoning for the budget estimates.

Expense	Description	$ amount
Vehicle	This includes fuel and maintenance per km (0.60 USD per km). 7,500 km total that we expect to drive in 6 months.	$4500
Airline Travel	A round trip ticket to Kenya (May 2016 – December 2016)	$2000

This $6500 represents 14.5% of my expected project budget of $45000.

20. **Are you willing to accept a general reduction in your budget?** Yes

21. **Are you willing to accept line item changes in your budget?** Yes

22. You may include additional attachments to supplement the application such as promotional material, resumes, letters of collaborative funding, etc.

Please find attached a detailed research project proposal. If letters of project support are required by Dr. Munir Virani I can ask him to provide one upon SSC request.

Submit project proposals and/or questions on proposal processes to **ukstudentsustainabilitycouncil@gmail.com** with **'SSC Proposal'** as the subject line.

If successfully funded, a councilmember will be assigned to your project. Failure to communicate with this person can result in a total or partial loss of funding. **Any changes in the use of approved funding must be resubmitted and re-approved by the Council. Unused funds are automatically returned to the SSC.**

Project proposals will be considered on a rolling basis and must be received 1 week prior a scheduled meeting in order to be considered for the agenda. If SSC and applicant are able to confirm that project, if funded, would be in compliance with University Business Procedures. The Fall 2015 meeting schedule is listed below:

Meeting date	**Proposal due date**
January 16, 2015 -	Proposals due by January 9, 2016

Literature Cited

Birdlife International. 2013. Polemaetus bellicosus. The IUCN Red List of Threatened Species.

Estes, J. a, J. Terborgh, J. S. Brashares, M. E. Power, J. Berger, W. J. Bond, S. R. Carpenter, T. E. Essington, R. D. Holt, J. B. C. Jackson, R. J. Marquis, L. Oksanen, T. Oksanen, R. T. Paine, E. K. Pikitch, W. J. Ripple, S. a Sandin, M. Scheffer, T. W. Schoener, J. B. Shurin, A. R. E. Sinclair, M. E. Soulé, R. Virtanen, and D. a Wardle. 2011. Trophic downgrading of planet Earth. Science (New York, N.Y.) 333:301–306.

I Title Page

A. Title of Project: The Ecology of the Martial Eagle (*Polemaetus bellicosus*) in the Maasai Mara region of Southern Kenya

B. Duration of Proposed Project (in months): 36 months

C. Calendar Date for Proposed Start of Project: December 2015

D. Calendar Date for Proposed Completion of Project: December 2018

E. Principal Investigator Information:

a. Your Name: Richard Stratton Hatfield

b. Professional Affiliation and Mailing Address: Masters Student at the University of Kentucky in the Department of Forestry. Office 218 Thomas Poe Cooper Building. University of Kentucky. Lexington KY 40546.

c. Phone Number: +1-606-471-0831

d. **E-mail Address:** stratton.hatfield@uky.edu

F. Authentication:

a. Your Signature: 

b. Date Signed: January 9th 2016

II Table of Contents

III Project Summary

Apex predators are critical components of ecosystems and their loss can result in trophic cascades (Estes et al. 2011). The Martial Eagle is the largest species of eagle in Africa and is an apex predator. It is listed at vulnerable by the IUCN and is in population decline throughout its range (Birdlife International 2013). Very little is known about the basic ecology of the Martial Eagle and there is an urgent need to fill this knowledge gap in order to better understand and prevent further population declines. The Maasai Mara ecosystem in Southern Kenya is a conservation area that has a significant, but largely unknown population of this species. This document proposes research that would seek to study the ecology of the Martial Eagle in the Maasai Mara region. The specific objectives of this project include assessing this species' diet, estimating its home range size and characterizing its nesting locations. A unique team of highly skilled and experienced collaborators has been assembled to carry out this project and ensure its success. This project would constitute the first Martial Eagle study to have been conducted in East Africa in over fifteen years and would provide essential ecological information that is required to adequately inform this species' conservation.

IV Project Description

A Introduction

a Context

Herein, I propose a Master's research project at the University of Kentucky, Department of Forestry that will seek to understand the ecology and inform the conservation of the Martial Eagle (*Polemaetus bellicosus)* in the Maasai Mara region of Southern Kenya. By successfully obtaining a Master's degree that focuses on raptor ecology, I hope to prepare myself for a career that involves working with local communities in Africa to sustainably manage protected conservation areas.

b Specific Project Objectives in the Maasai Mara region of Southern Kenya

Objective 1: Characterize Martial Eagle diet in the Maasai Mara region of Southern Kenya **Objective 2:** Estimate home range size of breeding pairs of Martial Eagle in the Maasai Mara region of Southern Kenya

Objective 3: Characterize nest site selection of the Martial Eagle in the Maasai Mara region of Southern Kenya

c Rationale and Significance

Within this section of the proposal you will find an overview of the relevant literature pertaining to the ecology and conservation of Martial Eagles as well as a justification for the need to implement this project.

i Literature Review

Apex predators exert top down regulation in trophic systems and are linked to higher levels of biodiversity and overall ecosystem health (Sergio et al. 2005, 2008); consequently, their loss can result in trophic cascades that can dramatically alter ecosystem function and composition (Estes et al. 2011). Apex predators are particularly at risk to anthropogenic impacts due to their large home range requirements and high trophic positioning, and as a result are increasingly confined to conservation areas (Woodroffe and Ginsberg 1998).

Raptors occupy the top trophic position in many terrestrial communities and are considered to be apex predators. They do not stay strictly within the confines of conservation areas as their home ranges are large and often extend far beyond protected boundaries making the conservation of these birds a challenge. Eagles are a group of raptors that are of particular concern due to their low population densities and unique life history strategies (low fecundity, sensitivity to anthropogenic disturbance, large territory size). A third of all eagle species are currently listed as threatened or endangered (Ferguson-Lees and Christie 2001).

The Martial Eagle is an inhabitant of savannah grassland, thorn brush, and semi-desert ecosystems throughout Sub Saharan Africa (Brown and Amadon 1968). They are the largest species of eagle in Africa (Brown and Amadon 1968) and are among the most sensitive to anthropogenic disturbance (Brown 1952) (Figure 1). The current population status of Martial Eagles is largely unknown, but numbers are considered to be declining in South Africa,

Namibia, Niger, Burkina Faso and Kenya(Brown 1991, Barnes 2000, Thiollay 2006, Thomsett and Virani pers. comm.); consequently, the Martial Eagle has been listed as vulnerable by the IUCN, and is a candidate for listing as an endangered species (BirdLife International 2015).

Rapidly declining Martial Eagle populations have created an urgent need to increase our understanding of this species' ecology in order to enact effective conservation measures. Most of our current knowledge on Martial Eagle ecology is based on a series of studies conducted in the Karoo and Kalahari region of South Africa in the 1980s and 1990s and from the work of the late Dr. Leslie Brown and Dr. Christian Smeenk in Kenya in the 1950s and 1970s (Brown 1952, 1953, 1955*a*, *b*, 1991, Brown and Amadon 1968, Smeenk 1974, Boshoff 1986, Boshoff et al. 1990, Boshoff and Wilson 1992, Herholdt and Kemp 1997). Other work has been anecdotal in nature or has remained unpublished.

The diet of Martial Eagles has been found to vary considerably with habitat (Boshoff et al. 1990). Game birds (Guinea fowl, Francolin and Bustards), small mammals (hares, hyrax, mongoose and small antelopes) and monitor lizards compromise a majority of their diet (Brown 1952, Boshoff et al. 1990). In the Embu region of Kenya and on farmland in central Namibia, Martial Eagles have preyed on livestock and poultry resulting in varying levels of anthropogenic tolerance and persecution (Brown 1952, 1991, Simmons and Christopher 2004).

Home range size has been studied primarily by looking at inter-nest distance (Boshoff and Wilson 1992, Herholdt and Kemp 1997). The only home range study on Martial Eagles utilizing transmitters was conducted by Carter Ong from 1997-1999 in the Athi region of Central Kenya. Ong studied two pairs of Martial Eagles that had home ranges of 205km^2 and 125km^2 respectively (Ong 2000). There is an ongoing study in the Kruger National Park in South Africa that is studying Martial Eagle home range using back pack transmitters (van Eeden pers. comm.).

Unlike many African eagles, Martials have been observed to select nest locations far from human habitation making them especially vulnerable to habitat encroachment (Brown 1952). Martial Eagles have been found to nest primarily in large trees on either rocky hills or in riverine vegetation (Brown 1952, Herholdt and Kemp 1997, Ong 2000). They typically have 2-3 nests within a pairs' territory

(Brown and Amadon 1968) and give birth on average to a single chick every 2 years (Brown 1952, Herholdt and Kemp 1997).

ii Progress on Preliminary Work

In early 2015 I reached out to guides, land managers and conservation professionals in the Maasai Mara ecosystem to request information on known breeding pairs of Martial Eagles. As a result of this preliminary work I have identified and mapped the nest locations for four pairs of Martial Eagles in the western and central regions of the Maasai Mara. Two of the identified nests are located in the Maasai Mara National Reserve while the remaining two are on community owned wildlife conservancies (Figure 2).

iii Need for and Significance of the Proposed Project

Conserving remaining Martial Eagle populations requires an extensive knowledge of this species' ecology. Most information available is dated, anecdotal, geographically biased and/or based on sample sizes less than or equal to three pairs. It is imperative that long-term studies utilizing modern technology are conducted on this species in order to remedy these issues.

The Maasai Mara/Serengeti region of Southern Kenya and Northern Tanzania is an intact 36,000 km^2 moist savannah ecosystem that has an unknown, but significant population of Martial Eagles. This document proposes a research project that would seek to understand the ecology of Martial Eagles throughout this area using modern technology (e.g. global positioning system (GPS) Global System for Mobile Communications (GSM) satellite leg band transmitters) and a sample size of at least six breeding pairs. The proposed research would be the first Martial Eagle study to have been conducted in East Africa in over fifteen years providing essential ecological information that will inform our knowledge about this species' ecology and its management in the Maasai Mara ecosystem of Southern Kenya.

B Experimental Plan

a Project Location and Site Characteristics

The Maasai Mara ecosystem is located in Southern Kenya and forms part of the greater Mara-Serengeti Ecosystem (Figure 3). The Maasai Mara ecosystem falls within the boundaries of Narok County in Kenya and is approximately 7000 km^2 in size (Oindo et al. 2003). 1500km^2 of this area has been designated as the Maasai Mara National Reserve and an additional ~1500km^2 has been demarcated as community owned wildlife conservancies (Figure 4). Habitats in this landscape include tall and short grassland, scrubland, woodland grassland, forest and agricultural lands. (Oindo et al. 2003). This region is rich in megafauna and has one of the last large ungulate migrations in the world. The pastoral Maasai people inhabit the Maasai Mara and engage in a number of economic activities including wildlife based ecotourism, livestock husbandry and agriculture.

b Materials and Methods

Materials and Methods for Objective 1: Characterize Martial Eagle diet in the Maasai Mara region of Southern Kenya

Diet will be assessed by placing camera traps at active Martial Eagle nests and by collecting prey remains at both active and inactive Martial Eagle nests. Camera traps will be placed at all active nests, about which I know, that are located within the Maasai Mara ecosystem during my field season. I estimate this number of nests to be between 3 and 6 based on preliminary work. I will use Bushnell trophy cameras due to their reliability and price. A camera trap will be placed approximately one week after a Martial Eagle chick has hatched and will remain until the chick has fledged (approximately 120 days);(Thomsett pers. comm.). I will access nests with the use of climbing gear. Camera traps will be placed 2-3 meters from the nest and will be mounted using a

Ram 1-inch ball joint mounting system (Figure 5). I will set the traps to take a picture every minute during daylight hours and each trap will be checked every thirty days to replace lithium batteries. Data will be analyzed by identifying all prey species seen on camera and quantifying their relative proportion.

The collection of prey remains (bone fragments, feathers etc) at both active and inactive Martial Eagles nests will be a continuous process throughout this studies field season and will occur at as many confirmed nest locations as possible. I estimate this number of nests to be between 15 and 20 based on preliminary work. When nest locations are identified all prey remains will be collected below nest sites and when possible from within the nest itself. Known nests will be visited at least twice during the field season of this project in order to collect prey remains. All prey remains will be identified to family level and when possible to species level through comparisons with osteological collections located at the National Museums of Kenya. The most common element or bone will be used to identify the minimum number of individuals represented when more than one prey individual of a species is identified at a nest. Using this data I will estimate percent frequency of occurrence of prey items from each nest.

For both sets of dietary data I will calculate species richness using the Shannon-Weiner diversity index: $H' = \sum_{i=0}^{R}(pi)(\ln(pi))$ where p_i is the proportion of individuals belonging to a specific prey species (Shannon and Weaver 1949) and I will calculate niche breadth using the Levin's index: $B = 1(\sum pi^2)$ where p_i is the relative frequency with which a species uses the i resources (Levins 1968).

Materials and Methods for Objective 2: Estimate home range size of breeding pairs of Martial Eagle in the Maasai Mara region of Southern Kenya

Home range size will be estimated utilizing GPS GSM satellite leg band transmitters that will be fitted to the tarsus of adult Martial Eagles (Figure 6). Martial Eagles will be caught using a simple Bal Chatri trap. Bal Chatri traps are the most common trap used to catch birds of prey (Berger and Mueller 1959). They consist of a cage covered in nooses with a bait placed inside (Berger and Mueller 1959). For this study we will use chickens as our bait (Thomsett pers. comm.).

I will place transmitters on at least twelve birds that represent a minimum of six breeding pairs and approximate an equal sex ratio of six males and six females. Transmitters will record GPS locations multiple times daily and will relay this information through the GSM network. The lifespan of these transmitters is estimated to by approximately 2 years at which time the transmitter will be remotely triggered to fall off of the bird.

Home ranges will be estimated using a fixed kernel analysis (Worton 1989). The mean and standard deviation will be calculated using the derived 95% km^2 area home range estimates.

Materials and Methods for Objective 3: Characterize nest site selection of the Martial Eagle in the Maasai Mara region of Southern Kenya

All nests located during my field season that have been confirmed to have been utilized by Martial Eagles will be used for this part of the study. An Information theoretic approach using a Multi Model Analysis will be used (Burnham & Anderson 1998). A number of covariates that include, but will not be limited to, distance to water, height of tree, diameter at breast height (DBH) and distance to human habitation will be used to build our model. All distance estimates will be made using ArcMap version 10.3 and Landsat data, DBH will be measured using a Biltmore stick and tree height will be measured using a clinometer.

c Statistical Significance of Data for this Project's Objectives

Due to the lack of a large study population of Martial Eagles, traditional tests that would evaluate the statistical power of my results cannot be used to analyze the data in this study. This is a common problem with studies involving large birds of prey with low population densities. The significance of this project's work is in its value as a foundational study that will lead to a deeper understanding of Martial Eagle ecology in East Africa. Similar studies to the one proposed, that have small sample sizes but have proven successful, include a home range study on Bonelli's eagle that was limited to seven birds (PérezGarcía et al. 2013), a home range and habitat use study on Booted Eagles that was limited to six birds (Martínez et al. 2007) and a dietary assessment of Short-toed Snake Eagles that was limited to four monitored nests (Bakaloudis and Vlachos 2011).

d Tentative Timetable of Project Activities

Activity	Start Date	End Date
Permit Applications and Grant Submissions	December 2015	May 2016
Field Season in Kenya	June 2016	November 2016
GPS Transmitter Data Collection	June/July 2016	June/July 2018
Data Analysis/Thesis/Papers	November 2016	June/July 2018
Complete Project and Publish	June/July 2018	December 2018

e Collaborative Arrangements

This project is a collaborative effort that brings together a unique team, with a diverse skill set, that will be essential for the successful implementation of the proposed project. All project collaborators, their professional affiliations, their email addresses and there specific project roles are outlined below.

Name	Institution/Organization	Title	Email Address	Project Role
Dr. John Cox	The University of Kentucky	Assistant Professor of Wildlife and Conservation Biology	jjcox@uky.edu	Primary advisor for Masters student Richard Stratton Hatfield
Dr. Munir Virani	The Peregrine Fund	Africa Program Director	tpf@africaonline.co.ke	Project coordinator in Kenya
Simon Thomsett	The Kenya Bird of Prey Trust	N/A	sthomsett@gmail.com	Transmitter and camera trap Expert
Dr. Ralph Buij	Alterra Wageningen University and Research Centre	Ecologist	ralph.buij@gmail.com	Grant writer and project advisor
Dr. Julien Terraube	University of Turku	Post-doctoral Researcher	jterraube@gmail.com	Grant writer and project advisor
Dr. Alexandre Villers	French National Centre of Scientific Research	Post-doctoral Researcher	villers.alexandre@gmail.com	Grant writer and project advisor

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C Research Outcomes

a Conclusions

Conclusions for Objective 1: Characterize Martial Eagle diet in the Maasai Mara region of Southern Kenya

The dietary data that I collect as a result of Objective 1 will indicate what species Martial Eagles prey on in the Maasai Mara region of Southern Kenya and in what proportion. I am specifically interested in livestock predation as these incidences could lead to anthropogenic persecution.

Conclusions for Objective 2: Estimate home range size of breeding pairs of Martial Eagle in the Maasai Mara region of Southern Kenya

The minimum home range estimates that we develop as a result of Objective 2 will provide insights into what minimum area is required to support a breeding pair of Martial Eagles in the Maasai Mara region of southern Kenya. These estimates will also indicate whether there is a difference in home range size between males and females and whether home ranges shift and change in size during breeding periods.

Conclusions for Objective 3: Characterize nest site selection of the Martial Eagle in the Maasai Mara region of Southern Kenya The nest site selection model that we build as a result of Objective 3 will provide a tool that could be used to identify nest site locations for Martial Eagles and predict areas that these birds are likely to use as breeding sites in the future. The model that we build could also be used in future as a guide to erecting platform nest sites that could be utilized by Martial Eagles in areas that currently lack suitable nesting locations.

b Expected Publications

Due to the lack of peer reviewed literature on Martial Eagles I expect to publish a minimum of 3 publications that correspond directly to my stated objectives. Possible journals that I could publish in include The Journal of Raptor Research, The Journal of African Ornithology, The Journal of African Raptor Biology, Conservation Biology and, if our dietary data includes predation on livestock, The Journal of Human Wildlife Conflict.

c Future Work

In this section I will outline how my conclusions for each stated objective pose research questions that lead to future work on Martial Eagles in the Maasai Mara Ecosystem of Southern Kenya

Future Work based on Conclusions for Objective 1: Characterize Martial Eagle diet in the Maasai Mara region of Southern Kenya

Our dietary characterization of Martial Eagles will lead to research questions pertaining to what "Top Down" effects Martial Eagles exert on prey species within the Maasai Mara ecosystem. In addition, our dietary data could implicate Martial Eagles as livestock predators which could result in anthropogenic persecution. Future work could address the role anthropogenic persecution plays in the decline of Martial Eagle populations in the Maasai Mara ecosystem.

Future Work based on Conclusions for Objective 2: Estimate home range size of breeding pairs of Martial Eagle in the Maasai Mara region of Southern Kenya

The home range estimates that I will produce will lead to future work that include modeling resource selection and habitat use of Martial Eagles in the Maasai Mara ecosystem. These models could be used to predict regions that this species occupies and highlight areas of conservation importance.

Future Work based on Conclusions for Objective 3: Characterize nest site selection of the Martial Eagle in the Maasai Mara region of Southern Kenya

The characterization of Martial Eagle nest site locations could lead to future work addressing the hypothesized decline of suitable nesting trees due to increased levels of Elephant damage (Thomsett pers. comm.).

D Potential Pitfalls, Limitations and Feasibility

a Potential Pitfalls

In spite of the considerable effort I have put in to designing my proposed project, it is not exempt from potential pitfalls. My greatest concern is my inability to find and identify a significant population of Martial eagles that will be available for study throughout the projects duration. I have attempted to overcome this potential pitfall be conducting preliminary work in the Maasai Mara that has confirmed at least 4 pairs of Martial Eagles and has indicated regions where we expect to find additional pairs.

An additional concern that I have with the project is the utilization of a GPS GSM leg mounted transmitter design that remains untested on raptors in the field. I hope to overcome this potential pitfall by hiring an experienced engineer, Theo Gerritts, to design, build and test the transmitters prior to their placement on Martial Eagles in the Maasai Mara. Theo Gerritts has built numerous successful custom leg mounted transmitters for avian ecologists worldwide (Buij pers. comm.). This potential pitfall could turn into a successful component of this project as the demonstrated use of GPS GSM leg mounted transmitters on Martial Eagles would provide an alternative transmitter model to the controversial backpack system that is currently used in raptor research(Marzluff et al. 1997).

A final concern that I have is the general logistics of working and conducting research in the Maasai Mara ecosystem in Kenya. This area is prone to adverse road conditions that prevent access to certain areas during the wet season. I have attempted to overcome this potential pitfall by planning my field season during the driest months of the year and by hiring a 4x4 Land Rover with mud tires and a mounted winch that will be serviced by mechanics that are based in the Maasai Mara.

b Limitations

The results of this project will be limited to moist savannah ecosystems in East Africa that are home to pastoral people groups and significant extant populations of native wildlife. Despite these limitations, this project will impact Martial Eagle conservation throughout this species' range due to the lack of relevant literature pertaining to this species' ecology and conservation.

c Feasibility

This project is feasible due to the collaborative efforts that are taking place in order to ensure this projects' success. Dr. Munir Virani and Simon Thomsett are considered by many to be East Africa's "Raptor Experts" and have over 40 years of combined experience in the region.

In addition to the project collaborators experience, I have worked in the Maasai Mara ecosystem intermittently for the last 7 years (2009 – 2015) on a variety of conservation projects. I speak Swahili and English fluently and am conversational in the local tribal language (KiMaa). Over the last 7 years I have built relationships with a majority of the land managers in the area and I have a good knowledge of the road network throughout the ecosystem.

With my project collaborators experience and my local knowledge of the region I am confident that this project will be successful in achieving its' stated objectives.

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VI Figure Legends

Figure 1: An adult female Martial Eagle in flight (Hatfield 2014).

Figure 2: An image taken from Google earth showing confirmed Martial Eagle nest locations in the Maasai Mara Ecosystem. Each nest location is marked with a yellow pin and surrounded by a 200km^2 buffer in red that illustrates a possible home range size for each pair. The black lines delineate conservation areas in the ecosystem (Hatfield 2015).

Figure 3: A map illustrating the position of the Maasai Mara region in the greater MaraSerengeti ecosystem that spans the countries of Kenya and Tanzania (The Serengeti-Mara-Ngorongoro Ecosystem 2014).

Figure 4: A map depicting the Maasai Mara National Reserve and 4 community owned wildlife conservancies. Please note that there are currently an additional 6 community owned wildlife conservancies surrounding the Maasai Mara National reserve (Maasai Mara, Ol Kinyei & Olare Motorogi Conservancies 2015).

Figure 5: An image showcasing a Bushnell camera trap and the mounting system that will be used during the proposed project (Hatfield 2015).

Figure 6: An image providing a basic overview of the GPS GSM leg band transmitters that will be developed by Theo Gerritts and used during the proposed project (Gerritts pers. comm.).

VII Figures

Figure 1

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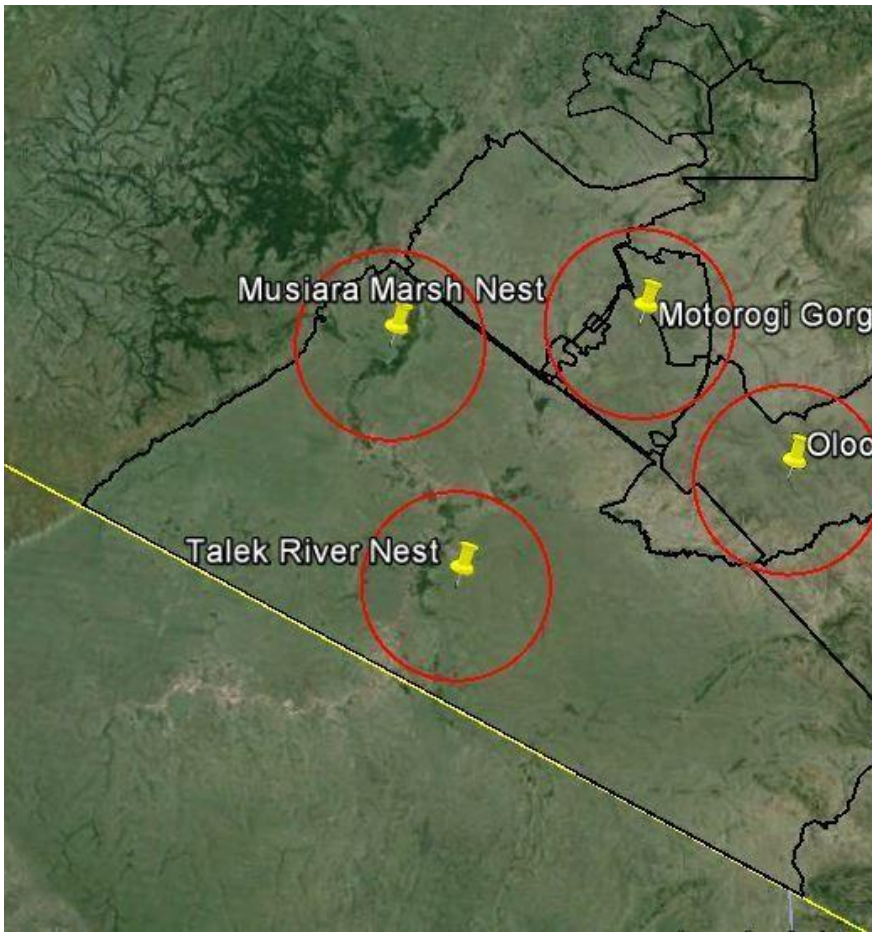

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Figure 3

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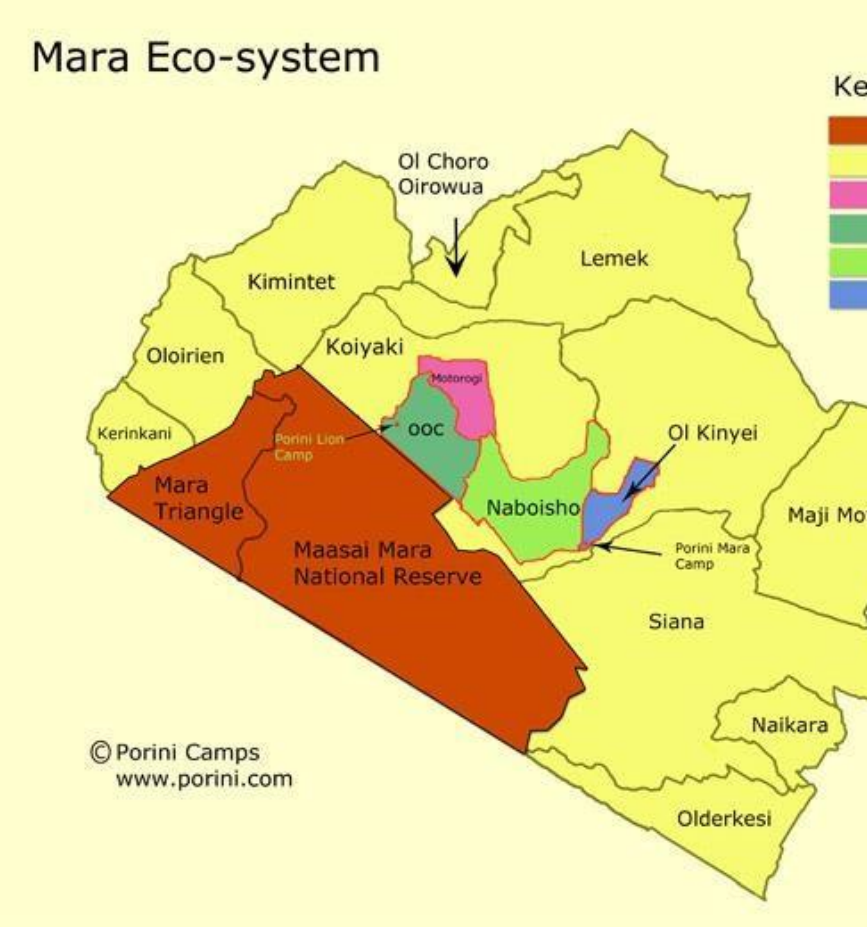

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Figure 5

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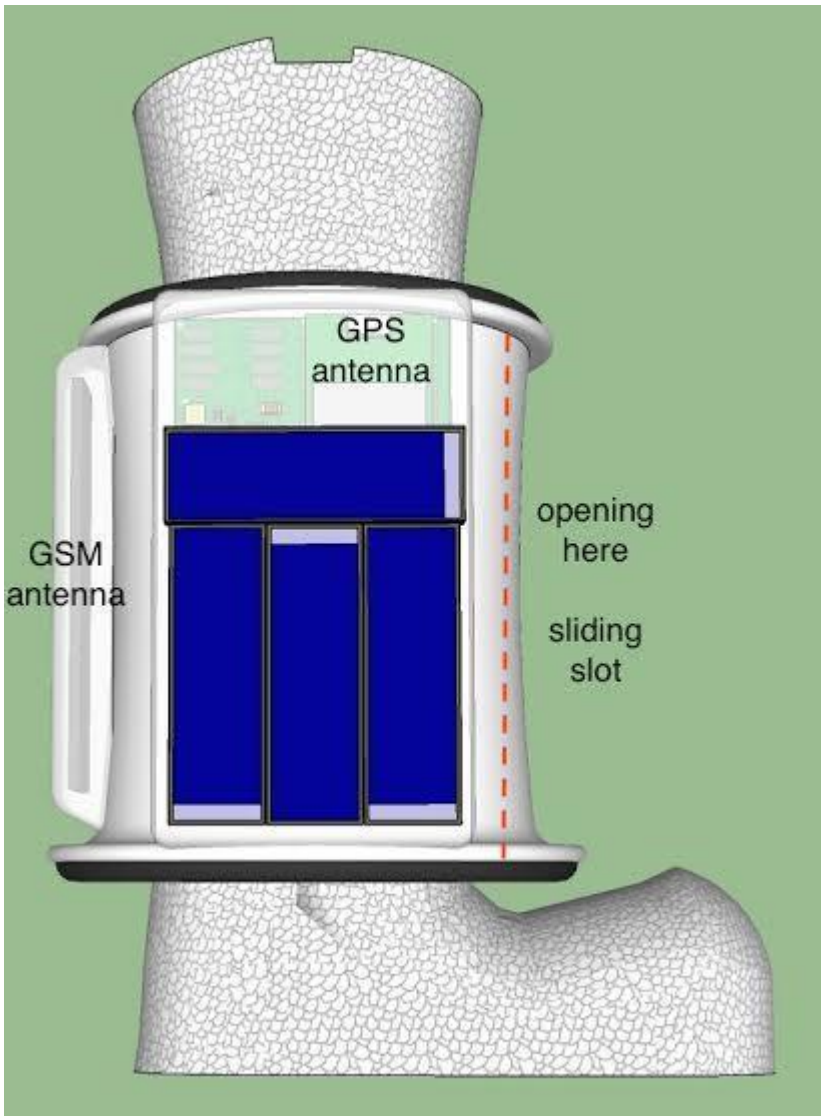

526 Figure 6

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VIII Acknowledgements

I would like to thank my team of collaborators for their constant support and encouragement throughout this projects' development. I would also like to thank the guides, land managers and conservation managers that provided my preliminary data, specifically Shiv Kapila and Lincoln Njiru. Finally I would like to thank Dr. David Wagner from the University of Kentucky for his advice and support throughout the creation of this project proposal.

University of Kentucky Student Sustainability Council
2015-2016 Grant Application

23. Name: Shane Tedder
24. Email:shane.tedder@uky.edu
25. UK Affiliation: Staff
26. Proposed Project Title: Partnership to Expand outdoor recycling options
27. If applicable, please provide the sponsoring or overseeing organization. (e.g. the Office of Sustainability, Wildcat Wheels, the Dept. of Ag. Economics, etc.):
28. Total Amount Requested from the Council: $10,000
29. Would you like to make a presentation to the Council before your proposal is reviewed? Yes

30. Please mark the primary and secondary focus areas of your project with a **1** and **2**, respectively.

- Recycling: (1)
- Transportation:
- Agriculture/Gardening:
- Water:
- Renewable Energy/ Energy Conservation:
- Climate Change:
- Local Environment:
- Behavioral Change: (2)
- Species Diversity/Conservation:
- Other (Please Describe):

31. Please name any other project leaders:

Name	**Mari Long**
Title & Department	Recycling Coordinator, Campus Physical Plant Division
Project Role	Co-coordinator
Email	m.long@uky.edu
Name	
Title & Department	
Project Role	
Email	

Please note that any project leaders listed will be excused for closed discussion of their project proposal.

32. Please describe the project, its goals, and how it contributes to UK student knowledge, attitudes & culture, or practices of the 3 pillars of sustainability (i.e. economic, environmental and social), including potential long term effects.

In the spring of 2012 thanks to a proposal by a student in the College of Public Health, funding from the Student Sustainability Council, and a partnership with campus PPD, UK launched its first full scale outdoor recycling pilot program. Link

Recycling is a cornerstone of sustainability within campus operations and is also a key concern for students on our campus. The 2012 Student Sustainability Survey found that 77% of students surveyed felt that the number of recycling bins on campus should be increased. The report also found that there was a strong "willingness to pay" in order for the number of bins to be increased. Link

In the years since the launch of the program, the number of outdoor locations served by the program has steadily grown and now stretches from WTY Library to the UK Student Center and includes Engineering, Law, Business, and Memorial Hall and the Kirwan Blanding Complex. The College of Agriculture and UK Healthcare are now priority areas for expanding the program.

This proposal is for funding to continue a partnership between the UK SSC and the UK PPD to purchase and install additional outdoor recycling receptacles to be placed strategically around campus. Each outdoor recycling bin funded by the council will include signage that indicates the Council's role in making the amenity possible.

33. Name any anticipated project affiliates and describe the extent of their support, including any financial, matching or in-kind support. Specific details are encouraged.

The Campus Physical Plant has agreed to provide matching funding up to approximately $10,000 for the purchase of new bins. PPD will additionally provide the staff and funding needed to ship, install, operate and maintain the units.

34. Please mark the primary target population of your project with a **1**.

- UK (general):AND VISITORS (1)
- Undergraduates:
- Graduates:
- Community:
- Faculty:
- Other (Please Describe):

In 250 words or less, please answer the following questions.

35. Describe the intended University of Kentucky audiences and potential number of people impacted including any potential diverse segments such as student or community organizations and supporting evidence (e.g. expected or historical event/speaker attendance).

    This project will continue to impact all members of our campus community and visitors to our campus, providing convenient recycling options and relaying the message that sustainability is a priority for the University.

36. Are there any students involved in the proposed project? If so, do they benefit from professional or technical skills, outputs, or experiences such as presentations, posters, or reports?

    Michaela Rogers, a student intern with the Recycling Office (funded by SSC grant) will receive some experience in the placement and installation of these units.

37. Please describe any previous history and to what extent you, other project leaders, or the sponsoring organization may have with the UK Student Sustainability Council.

    This would be the fourth round of funding earmarked for expanding outdoor recycling on campus in partnership with Campus PPD. It is one of the more visible projects funded by the SSC and strengthens an existing relationship between the SSC and PPD.

38. Please outline a timeline and milestones to ensure project efficacy prior to and after project implementation.

    - Map locations where outdoor recycling bins are needed (complete already)
    - Order additional recycling containers – January February 2016
    - Order custom signage that indicates what can go in container as well as SSC support – February 2016
    - Place containers –March April 2016

39. Does the success of your project require prior approval of other UK or non-UK entities (e.g. IRB or venue approval, etc.)? If so, please provide supporting documentation.

    Yes, campus physical plant. See attached

40. Please demonstrate how the Student Sustainability Council will be credited or advertised in your project (this can include promotional material). Would a project leader be available for a radio interview?

    Signage on each bin will credit the support from the SSC, see image below for example. Definitely available and willing to participate in radio interview about the project.

41. Using the following format, please provide a line item budget for the total amount request and what percent of the project is being sponsored by SSC funding. Provide information sources or reasoning for the budget estimates.

Expense	Description	$ Total	$Total from SSC	Source of remaining funds
Recycling Bins	15 Scarborough Outdoor Recycling bins	$20,100	$10,000	UK PPD
Custom Signage	Signs and stickers for the bins	TBD	0	UK PPD
Labor	Installation, including new concrete bases if needed	TBD	0	UK PPD
Shipping	Freight charges to deliver units to UK	TBD	1730	UK PPD

42. Are you willing to accept a general reduction in your budget? Yes
43. Are you willing to accept line item changes in your budget? Yes
44. You may include additional attachments to supplement the application such as promotional material, resumes, letters of collaborative funding, etc.
    - Letter confirming collaborative support from PPD recycling is attached.
    - Quote from vendor documenting price of the bins and shipping also attached.

See attached map of new locations for outdoor recycling bins.

Submit project proposals and/or questions on proposal processes to ukstudentsustainabilitycouncil@gmail.com with **'SSC Proposal'** as the subject line.

If successfully funded, a councilmember will be assigned to your project. Failure to communicate with this person can result in a total or partial loss of funding. **Any changes in the use of approved funding must be resubmitted and re-approved by the Council. Unused funds are automatically returned to the SSC.**

Project proposals will be considered on a rolling basis and must be received 1 week prior a scheduled meeting in order to be considered for the agenda. If SSC and applicant are able to confirm that project, if funded, would be in compliance with University Business Procedures. The Fall 2015 meeting schedule is listed below:

Meeting date	**Proposal due date**
~~October 13, 2015 -~~	~~Proposals due by October 6, 2015~~
~~October 27, 2015 -~~	~~Proposals due by October 20, 2015~~
~~November 10, 2015 -~~	~~Proposals due by November 3, 2015~~
~~December 8, 2015 -~~	~~Proposals due by December 1, 2015~~
January 16, 2015 -	Proposals due by January 9, 2016

UNIVERSITY OF KENTUCKY
Recycling

January 8, 2016

University of Kentucky
Student Sustainability Council
Lexington, KY 40506

Dear University of Kentucky Student Sustainability Council:

The University of Kentucky Physical Plant Recycling Office would like to continue the partnership of purchasing outdoor single stream recycling containers with the funding from the Environmental Stewardship Fee. With $10,000.00 matching funds for the ongoing project, it will allow the purchase of 15 additional containers ($1,340.00 each).

There are two maps for you to review: one is of the placed outdoor containers and one with locations still requiring containers. As with the previous purchases, there is a sign on each recycling container that reads: Funded by the Environmental Stewardship Fee, Recycling Aluminum Cans, Paper Products, Plastic Bottles, and Glass Bottles, University of Kentucky. With an order in the near future, the outdoor containers will be in place by the end of March.

Your ongoing support of this initiative, to make single stream recycling options available across campus, is extremely important and appreciated.

Thank you for considering this proposed matching funds project.

Sincerely,

Mari Long
University of Kentucky

Recycling Coordinator

University of Kentucky Student Sustainability Council
2015-2016 Grant Application

45. Name: Shane Tedder
46. Email: shane.tedder@uky.edu
47. UK Affiliation: Student Programming Coordinator: Office of Sustainability
48. Proposed Project Title: 2016-2017 Student Internships.
49. Overseeing Organization: Office of Sustainability and Tracy Farmer Institute for Sustainability and the Environment
50. Total Amount Requested: $9000
51. Presentation to council: Yes

52. Please mark the primary and secondary focus areas of your project with a **1** and **2**, respectively.

- Recycling:
- Transportation:
- Agriculture/Gardening:
- Water:
- Renewable Energy/ Energy Conservation:
- Local Environment:
- Behavioral Change:
- Species Diversity/Conservation:
- **(1)** Other (Please Describe): Student Leadership
- **(2)** Each of the six interns will be working in a unique area of sustainability on campus
- Climate Change:

53. Please name any other project leaders: In addition to project co-lead below, each intern will be working with a mentor in their focus area who is a either a full time faculty or staff member.

Name: Rebecca McCulley
Title & Department: Interim Director Tracy Farmer Institute for Sustainability and the Environment
Project Role: Co-Lead and Co-funder
Email: Rebecca.Mcculley@uky.edu

Name
Title & Department
Project Role

Email

Please note that any project leaders listed will be excused for closed discussion of their project proposal.

54. Please describe the project, its goals, and how it contributes to UK student knowledge, attitudes & culture, or practices of the 3 pillars of sustainability (i.e. economic, environmental and social), including potential long term effects.
55. The Office of Sustainability is requesting funding from the Student Sustainability Council to continue the recently restructured sustainability internship program. If approved, the funding would help sustain a more robust and meaningful internship experience for our undergraduate students interested in sustainability. Last year, the Office of Sustainability restructured our internship program by partnering with the Tracy Farm Institute for Sustainability and the Environment to offer a total of 6 internships for students.

    The new internship positions offered are dynamic and unique because the internship will be housed in the Office of Sustainability but the interns will be paired closely with either an operational unit like UK Recycling or one of the TFISE Working Groups. Interns will provide general support to the working group or operational unit, and will also work closely with mentors from those areas to develop an independent project that they will focus on for the year. We are using the Indiana University program as a model for this revitalization: http://sustain.indiana.edu/~sustain/programs/internship-program-in-sustainability/index.php

    TFISE Role:

    Once the intern is assigned to a working group, then they will be co mentored by a member of that working group and will develop and work on their projects with the TFISE staff. The intern will spend 5-10hrs/week working with the co-mentor on their projects throughout the year.

    Office of Sustainability Role:

    The Office of Sustainability would handle the hiring, payroll, and training of all the interns. The OS will provide training that focuses on sustainability initiatives and basic skills needed to organize, host meetings, coordinate events, and a how to on developed presentations.

    If we are successful in organizing funding, the selection process will begin in early spring for both TFISE and Office of Sustainability interns.

56. Name any anticipated project affiliates and describe the extent of their support, including any financial, matching or in-kind support. Specific details are encouraged.

    TFISE will provide funding for 3 internships ($9000) and will identify three working groups to host and mentor the interns

57. Please mark the primary target population of your project with a **1**.

    - UK (general):
    - Undergraduates: (1)
    - Graduates:
- Community:
- Faculty:
- Other (Please Describe):

In 250 words or less, please answer the following questions.

58. Describe the intended University of Kentucky audiences and potential number of people impacted including any potential diverse segments such as student or community organizations and supporting evidence (e.g. expected or historical event/speaker attendance).

    UK Undergraduates are will be targeted for filling in the internships and we hope to continue to offer 6 opportunities for the fall of 2016.

59. Are there any students involved in the proposed project? If so, do they benefit from professional or technical skills, outputs, or experiences such as presentations, posters, or reports?

This project is primarily focused on student engagement and the interns will gain a deep understanding of particular sustainability issues related to their selected project and will have the opportunity to coordinate meetings, deliver presentations and write reports. Office of Sustainability will provide training for all interns that includes basic sustainability overview as well as technical training in presentations, reports, meetings and communications.

60. Please describe any previous history and to what extent you, other project leaders, or the sponsoring organization may have with the UK Student Sustainability Council.

    The Office and the ISE have collaborated on a variety of projects in the past, most recently on the UK Sustainability Challenge Grant Program and the 2015-2016 Internship Program.

61. Please outline a timeline and milestones to ensure project efficacy prior to and after project implementation.
    - January February 2016: Secure funding ($9000 from SSC and $9000 from TFISE)
    - February - March 2016: Work with organization units and working groups to formalize structure of internship opportunities and draft call for applications.
    - March 2016: Solicit applications
    - April 2016: Select and announce interns
    - August 2016: Kick off training for all interns and set up meetings with their mentor work group/organizations
    - August-May: Bi Weekly meetings between interns and UK Sustainability Coordinator
    - November 2016: Interns will present Progress at the Sustainability Challenge Grant Award Ceremony and TFISE Research Showcase.
    - January/February 2017: Funding renewal for 2017-2018 will be sought and recruitment process will begin.
    - April 2017: Interns will present project impact posters during an Earth Days in the Bluegrass event.
62. Does the success of your project require prior approval of other UK or non-UK entities (e.g. IRB or venue approval, etc.)? If so, please provide supporting documentation.

63. Please demonstrate how the Student Sustainability Council will be credited or advertised in your project (this can include promotional material). Would a project leader be available for a radio interview?

    The SSC funding contribution to this program will be acknowledged on the website and on all print materials produced for the overall program or for the individual projects. Definitely willing to do radio interview.

64. Using the following format, please provide a line item budget for the total amount request and what percent of the project is being sponsored by SSC funding. Provide information sources or reasoning for the budget estimates.

Expense	Description	$ Total	Total from SSC
Payroll	Approximately 10 hours per week at $10 per hour for 32 weeks for 6 interns($3000x6)	$18,000	$9000
	Remaining $9000 from the TFISE		

65. Are you willing to accept a general reduction in your budget? Yes.
66. Are you willing to accept line item changes in your budget? Yes.
67. You may include additional attachments to supplement the application such as promotional material, resumes, letters of collaborative funding, etc.
    - Two posters detailing the first semester of work by the current cohort of interns are attached.
    - A written confirmation of the collaborative funding has been requested and committed, but was not received by the time of submission. I will send this on as soon as it is received.

Submit project proposals and/or questions on proposal processes to **ukstudentsustainabilitycouncil@gmail.com** with **'SSC Proposal'** as the subject line.

If successfully funded, a councilmember will be assigned to your project. Failure to communicate with this person can result in a total or partial loss of funding. **Any changes in the use of approved funding must be resubmitted and re-approved by the Council. Unused funds are automatically returned to the SSC.**

Project proposals will be considered on a rolling basis and must be received 1 week prior a scheduled meeting in order to be considered for the agenda. If SSC and applicant are able to confirm that project, if funded, would be in compliance with University Business Procedures. The Fall 2015 meeting schedule is listed below:

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January 16, 2015 -	Proposals due by January 9, 2016