



S F S THE SCHOOL
FOR FIELD STUDIES

African Large Carnivores: Ecology and Conservation

SFS 3121

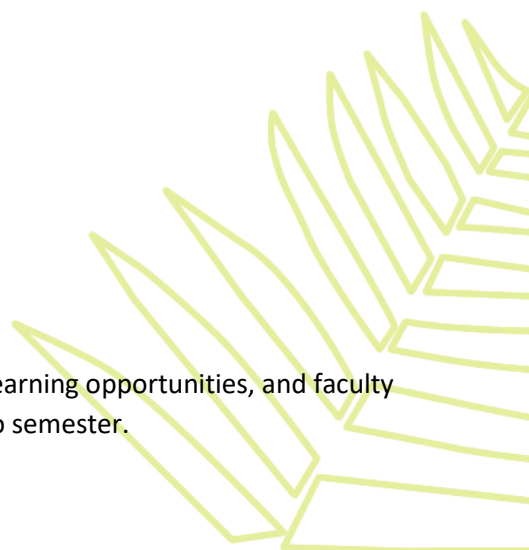
Syllabus
4 credits

The School for Field Studies (SFS)
Center for Wildlife Management Studies (CWMS)
Rhotia, Tanzania

This syllabus may develop or change over time based on local conditions, learning opportunities, and faculty expertise. Course content may vary from semester to semester.

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COURSE CONTENT SUBJECT TO CHANGE

Please note that this is a copy of a recent syllabus. A final syllabus will be provided to students on the first day of academic programming.

SFS programs are different from other travel or study abroad programs. Each iteration of a program is unique and often cannot be implemented exactly as planned for a variety of reasons. There are factors which, although monitored closely, are beyond our control. For example:

- Changes in access to or expiration or change in terms of permits to the highly regulated and sensitive environments in which we work;
- Changes in social/political conditions or tenuous weather situations/natural disasters may require changes to sites or plans, often with little notice;
- Some aspects of programs depend on the current faculty team as well as the goodwill and generosity of individuals, communities, and institutions which lend support.

Please be advised that these or other variables may require changes before or during the program. Part of the SFS experience is adapting to changing conditions and overcoming the obstacles that they may present. In other words, this is a field program, and the field can change.

Course Overview

The conservation status of many African large carnivore species is of global concern indicated by their IUCN red list status; examples include the African wild dog (endangered), African lion (vulnerable), Spotted hyaena (least concern), Cheetah (vulnerable), and African leopard (vulnerable) **(Plate 1)**. Ecologically, large carnivores are keystone species due to their position at the top of the food chain. Frequently large carnivores can be a source of attraction and wonder, and play a major role in the ecotourism industry in many African countries. At the same time, carnivores can threaten peoples' safety and livelihood through attacks on livestock which leads to persecution and retaliatory killing of carnivores by people. The negative impacts caused by carnivores also engender negative attitudes toward carnivore conservation and management in human-dominated landscapes.

Carnivore populations have suffered significant declines in their populations across the continent due to habitat loss, depletion of natural prey, and direct persecution by people. A better understanding of these factors is of special interest to provide evidence for effective conservation. Few countries in Africa parallel Tanzania in large carnivore diversity and abundance and conservation efforts. Tanzania has at least 35 species of carnivores which is over half of the continent's carnivore species. Tanzania also has one of the highest populations of lions and wild dogs in Africa.

This four-week course will focus on the behavioral ecology and conservation of large carnivores in Africa using northern Tanzania as a case study. SFS Center for wildlife management studies in Tanzania is an ideal location to explore the ecological and human dimensions of large carnivore conservation. The center is located between the Ngorongoro-Serengeti (NSE) and Tarangire-Manyara (TME) ecosystems in northern Tanzania. Both ecosystems have largely intact carnivore guilds that occur within and outside the protected areas. Large carnivores are one of the main attractions in the vibrant photographic tourism industry. In addition, large carnivores attract high premiums among the trophy hunters in the area. Despite the high economic values, carnivores in northern Tanzania are under immense threats from human-related effects such as habitat loss, and conflicts with pastoralists. To address these challenges, large carnivores have attracted high interest among conservationists, researchers, and scientists in northern Tanzania. African wild dogs, African lions, spotted hyenas, cheetahs, and leopards have received high attention due to their charismatic appeal and the manifold threats facing them. Among those species, lions, and leopards are among the big five and are highly sought after by trophy hunters. To address the conservation threats and better understand the ecology of these large carnivore species in northern Tanzania, several conservation and research projects have been initiated. These include the Tarangire Lion Research Project in Tarangire/Manyara National Parks and the surrounding areas, the Kope Lion Project in Ngorongoro Conservation Area, and species-specific projects in Serengeti National Park focusing on the lion, cheetah, spotted hyena, and African wild dog.



Cheetah (*Acinonyx jubatus*)



African lion (*Panthera leo*)



Leopard (*Panthera pardus*)



Spotted hyena (*Crocuta crocuta*)



African wild dog (*Lycaon pictus*) (vignette.wikia.nocookie.net)

Plate 1: Major carnivore species in the Tarangire-Manyara Ecosystem

This course will be offered as a case study integrating scientific and conservation questions regarding large carnivores in the TME and NSE. The study area encompasses world-famous protected areas in northern Tanzania including Tarangire, Lake Manyara, and Serengeti National Parks, Ngorongoro Conservation Area, Manyara Ranch, Burunge, and Randilen Wildlife Management Areas (**Figure 1**). These national parks and adjacent community-based conservation areas offer an ideal site to provide students with experiential field-based training in large carnivore ecology and conservation.

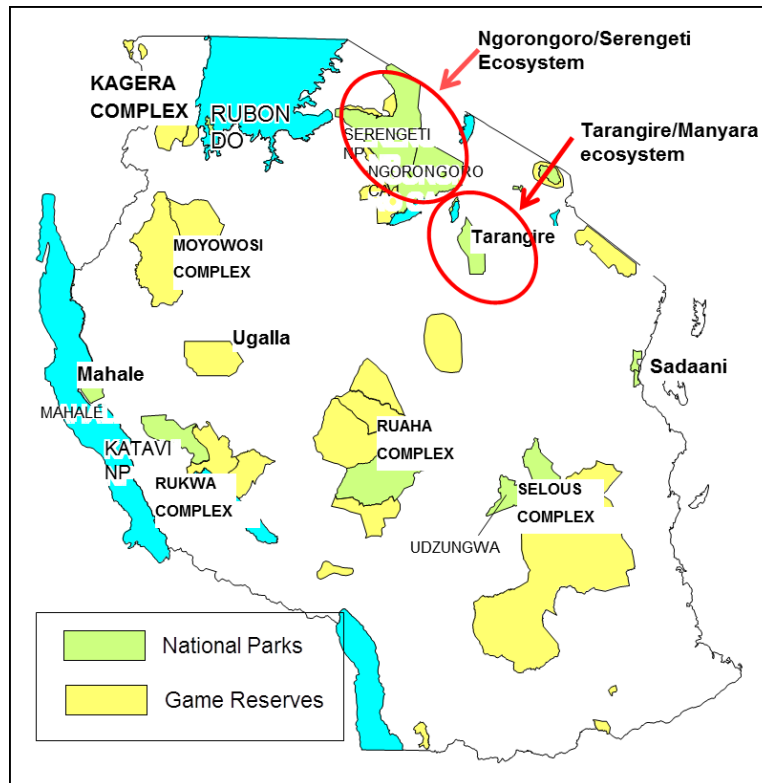


Figure 1: A Map of Tanzania showing the location of the Ngorongoro-Serengeti and Tarangire-Manyara Ecosystems.

The course will address issues related to large carnivore natural history, behavioral ecology, carnivore monitoring techniques, and human-carnivore interactions and threats they face. In the course of the program, students will learn the current issues in the large carnivore conservation debate and current techniques for studying and managing large carnivores. This will be done through a combination of lectures from large carnivore experts, videos, and field-based ecological and social research. The field training especially on ecological aspects of the course will be conducted in the state-owned and community-owned protected areas in addition to dispersal and migratory areas found in village land. The social surveys will include participatory social learning techniques in the villages adjacent to protected areas. The data collected will be analyzed using advanced

techniques and hence will offer students social and ecological analytical skills vital for research and conservation. Research results will be communicated to relevant stakeholders to support evidence-based decision-making. During this program, students will interact with wildlife experts and local community members daily. The area is primarily home to Maasai, and Iraqwi people, and students will learn the historical and modern-day interactions between indigenous communities and large carnivores.

Field training expeditions

This program will involve two four-day field expeditions to Tarangire-Manyara Ecosystem and Ngorongoro-Serengeti Ecosystem. These expeditions will provide unique settings for experiential learning; due to the relatively high diversity and abundance of large carnivores, and other large mammalian prey species (such as giraffes, wildebeest, zebra, buffalo, and gazelles), it will provide an important opportunity for studying and practicing observational skills in behavioral and ecological studies, and field techniques for monitoring and observing predator-predator and predator-prey interactions.



Plate 2: Left: Field research station for Tarangire Lion Project in Tarangire NP.
Right: SFS students during a visit to the lion research station.



Plate 3: A lioness fitted with a radio collar in the Tarangire-Manyara Ecosystem

In Tarangire National Park, students will have the opportunity to visit a field research station of the Tarangire Lion Project and learn about the project activities (**Plate 2**). The Tarangire lion project is a long-term field research and conservation project that has been operating in the area for over twenty years. The project has been involved in lion research and conservation work in the Tarangire-Manyara Ecosystem. Through monitoring the project has been collecting data on the ecology, demography, and spatial movement from protected areas across into the communal land. The project has also been working with pastoralist Maasai communities on issues of human-carnivore conflicts and the implementation of conflict mitigation strategies. At the lion field research station students will learn various

techniques such as VHF and GPS-based telemetry technology used for long-term carnivore research and how such techniques contribute to the understanding of species' behavioral, ecological, demography, and human-carnivore conflicts (**Plate 3**).

Learning Objectives

The main objective of the course is to equip students with adequate knowledge of behavioural ecology and the current management and conservation issues for large carnivores in northern Tanzania with some references from other African countries where similar species occur. The course is tailored to providing students with knowledge and skills for evidence-based large carnivore research and conservation. The course has the following specific objectives:

1. To gain knowledge of the behavioral ecology and life histories of carnivores in a savanna ecosystem
2. To gain knowledge on the threats and conservation approaches for carnivores in a savanna ecosystem
3. To develop skills for conducting ecological and social research and monitoring carnivores species (including behavioral observation, predator-prey interactions, human-carnivore interactions, density, and abundance estimates)
4. To understand the knowledge of local people's interactions with carnivores in northern Tanzania

Assessment

Assessment Item	Value (%)
Construction and Analysis of Lions' Home Ranges	35
Field Observations of Apex and Mesopredators	15
Survey on Human-Carnivore Conflicts	15
Final Exam	25
Participation	10
TOTAL	100

Construction and Analysis of Lions' Home Ranges (35%)

This is a lab session in which students will use long-term telemetry data collected by the Tarangire Lion Research Project from the lion population in the TME. From the collected data, students will construct, analyze, visualize, present, and discuss findings of the lion home ranges/territories in the TME. This lab session builds on the field exercise on radio telemetry technique and lion tracking exercise.

In this lab session, students will have the opportunity to acquire hands-on experience on how to use QGIS in constructing home ranges/territories, determining their sizes, and relating territory sizes to territory qualities. Students will develop data management and analytical skills and acquire knowledge on how to analyze and visualize data using QGIS software. Students will apply the knowledge acquired from the lecture on Scientific and Technical Writing to develop a 2,000-word science communication article.

Field Observations of Apex and Mesopredators (15%)

This field exercise will be undertaken over several weeks and on occasion during field visits to TME and NSE. Students will have the opportunity to closely observe and record carnivore behaviors, time budgets, activity patterns, and how they interact with their natural environment, other predators and their prey. Students will learn how to organize, analyze, visualize, and present information that will form the basis of debriefing discussions and final report.

Survey on Human-Carnivore Conflicts (15%)

This assignment will be based on a study in Monduli, district, at Selela village involving social surveys with pastoralist communities to assess the perception and attitudes towards large carnivores and carnivore conservation. Students will host focus group discussions to interact and ask questions to community members. Students will work in groups of 2-3, practice social research skills for data collection, and data analysis. A group report will be written to synthesize and interpret the data.

Final Exam (25%)

At the end of the program, you will have a two-hour exam. The exam may be based on material from case studies, readings, class, guest lectures, field lectures, discussions, videos, field exercises and observations.

Participation (10%)

This assessment strategy seeks to encourage students to actively participate in class discussion, and to motivate students to do the background reading and preparation for a class session. Active participation will encompass active learning in class, lab, field exercises, during expeditions, and group work.

Grading Scheme

Grade corrections in any of the above items should be requested in writing at least 24 hours after assignments are returned. No corrections will be considered afterwards.

A	95.00 - 100.00%	B+	86.00 - 89.99%	C+	76.00 - 79.99%	D	60.00 - 69.99%
A-	90.00 - 94.99%	B	83.00 - 85.99%	C	73.00 - 75.99%	F	0.00 - 59.99%
		B-	80.00 - 82.99%	C-	70.00 - 72.99%		

General Reminders

Readings – Assigned readings and handouts (exercises/assignments) will be available prior to the scheduled activities. Course readings must be read and clarification on issues sought where necessary since ideas and concepts contained in them will be expected to be used and cited appropriately in assigned course essays and research papers.

Plagiarism – Using the ideas and material of others without giving due credit is cheating and will not be tolerated. A grade of zero will be assigned if anyone is caught cheating or aiding another person to cheat actively or passively (e.g., allowing someone to look at your exam).

Deadlines – Deadlines for written field exercises and other assignments are posted to promote equity among students and to allow faculty ample time to review and return assignments in good time. As such, deadlines are firm and extensions will only be considered under the most extreme circumstances. Late assignments will incur a 10% penalty for each hour that they are late.

Participation – Since we offer an intensive program, missing even one lecture can have a proportionally greater effect on your final grade simply because there is little room to make up for the lost time. Participation in all components of the program is mandatory because your actions can significantly affect the experience you and your classmates have while at CWMS. Therefore, students must be prompt for all course activities.

Course Content

Type- L: Lecture, **FL:** Field Lecture, **GL:** Guest Lecture, **FEX:** Field Exercise, **D:** Discussion, **Lab:** Workshop

No	Title and outline	Type	Time (hrs)
1	Course Overview Introductory lecture on the course content, schedule, assignment, and grading protocols. It will set the general expectations for this course.	L	2.0
2a	Spatial Ecology I: Home Ranges and Territoriality Students will learn why some carnivores form territories whereas others don't. Besides, they will learn how to differentiate home ranges from territories and factors that determine variation in home range sizes. Students will discuss some costs and benefits of territoriality and their ecological and conservation implications.	L	2.0
2b	Spatial Ecology II: Construction and Analysis of Lions' Home Ranges Students will use long-term telemetry data collected by the Tarangire Lion Research Project from the lion population in the TME to construct, analyze, present, and discuss findings of the lion home ranges in the ecosystem.	Lab	4.0
3a	Human-Carnivore Conflicts mitigation experience in Tarangire This session will involve a field lecture on the extent, patterns, and impacts of human-carnivore conflicts in TME, followed by a visit to pastoralist community households in villages surrounding protected areas especially Tarangire NP where students will interact with community members to learn about their experiences in interacting with carnivores regularly.	FL	6.0
3b	Field research experience and operations for the African large carnivores This will be a case-study field lecture where students will visit the Tarangire Lion Research Project base Camp in Tarangire Park to interact with project staff and get first-hand information on the logistical and operational aspects involving the large carnivore field research project. The aim is to provide students with experiential learning about large carnivore research in the African context using the lion project as a case study.	FL	2.0
4a	Behavioral Ecology I: Apex and Mesopredators (Theory) This class will provide a series of lectures providing students with insights into the natural history, behavior, and ecology of select major carnivore species in the African savannah including spotted hyena, lion, leopard, cheetah, and wild dog. 1 -2 hour lectures on each species will be given.	L	8.0
4b	Behavioral Ecology II: Field Observations of Apex and Mesopredators This field exercise will happen over several weeks and occasions during field visits to Tarangire NP, Lake Manyara NP, Ngorongoro Conservation Area, and Serengeti National Park. The aim of the exercise is to i) provide students with the opportunity for field observations of various species of large carnivores found in the wild and record observed interactions between carnivores-carnivore and carnivore and their prey, and ii) undertake behavioral sampling of several carnivore species encountered	FEX	9.0

No	Title and outline	Type	Time (hrs)
	within protected areas during field visits. The information will be used at the end of the Serengeti expedition for a class debrief discussion on predator-prey interactions and time budgets for the observed species.		
5	Socio-survey techniques for the African large carnivore studies This lecture will introduce social study techniques and protocols for conducting research for the management and conservation of large carnivore populations. Students will specifically learn how to design a structured questionnaire survey and conduct Focus Group Discussion (FGD) focusing on human-carnivore interactions.	L	2.0
6	A survey on Carnivore-Livestock conflicts and their mitigation measures Students will undertake a field survey in the TME to investigate the scale of interactions between large carnivores and livestock, focusing on human-carnivore conflicts and mitigation measures. The survey will also assess attitudes and perceptions of conflicts among local communities. Students will analyze the data collected and present the results.	FEX	5.0
7	Carnivore Monitoring Techniques This lecture covers the techniques used for short-term and long-term carnivore population monitoring such as camera trapping, radio telemetry, signs/indices/spoors, callbacks, and citizen science. The lecture will highlight how techniques have been applied in N. Tanzania and beyond.	L	2.0
8	Scientific and Technical Writing Students will learn skills that will enable them to write publishable scientific articles and technical reports. The course will prepare students for writing scientific and technical reports during the program and in their careers. Besides, students will be exposed to common pitfalls for the rejections of articles in scientific journals that may also apply to getting low grades in their reports.	L	2.0
9	African large carnivore diseases This will be a class lecture by a wildlife veterinarian /researcher working on aspects related to wildlife diseases in the wilderness with particular emphasis on carnivore disease epidemiology. The lecture aims to highlight the economic importance of diseases to long-term carnivore conservation	GL	2.0
10	Final Excursion This will be a travelling lecture on the role of land scape on the conservation of large canivores in the Tarangire-Manyara ecosytem	FL	4.0
	Total		50
	UMN Instructional Hours*		60

*[UMN defines](#) an instructional hour as a 50-minute block. SFS syllabi are written in full 60-minute hours for programming purposes. Therefore 50 full hours = 60 UMN instructional hours (for four credit courses) and 25 full hours = 30 UMN instructional hours (for two credit courses).

Reading List

1. Bauer, H., Packer, C., Funston, P.F., Henschel, P. & Nowell, K. (2016). *Panthera leo* (errata version published in 2017). The IUCN Red List of Threatened Species 2016: e.T15951A115130419. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T15951A107265605.en>. Downloaded on 10 February 2018.
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7. Estes, R. D. (1991). *Behavioral Guide to African Mammals including Hoofed Mammals, Carnivores, and Primates*. Awake Forest Studium Book. Russel Friedman Books Publishers. South Africa. 611pp.
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10. Holekamp K.E., Sakai, T. S., Lundrigan, L.B., (2007). Social intelligence in the spotted hyena (*Crocuta crocuta*). *Philosophical Transactions of the Royal Society B*. 362: 523-538.
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12. Kissui, B. M. (2008). Livestock predation by lions, leopards, spotted hyenas, and their vulnerability to retaliatory killing in the Maasai steppe. *Animal Conservation* 11:422-432.
13. Kissui, B.M., Packer, C. (2004). Top-down regulation of a top predator: lions in the Ngorongoro crater. *Proceedings of the Royal Society of London B*. 271: 1867-1874
14. Maher, C. R., & Lott, D. F. (2000). A Review of Ecological Determinants of Territoriality within Vertebrate Species. *The American Midland Naturalist*, 143(1), 1–29. doi:10.1674/0003-0031(2000)143[0001:aroedo]2.0.co.
15. Micaela et al., (2007). Courtship and mating in free-living spotted hyenas. *Behavior* 144, 815-846.
16. Msoffe, F. et al. (2011). Spatial correlates of land-use change in the Maasai-Steppe of Tanzania: Implications for conservation and environmental planning. *International Journal of Biodiversity and Conservation* 3, 280-290.
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