Behavioral ecology of African wolf (*Canis lupaster*) and its implication for Ethiopian wolf (*Canis simensis*) conservation in the Ethiopian Highlands

PhD dissertation defense

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October 1, 2020

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OUTLINE OF THE PRESENTATION

1. Introduction
2. Aim of the Study
3. General Methodologies
4. Papers I-IV
5. Conclusions and Recommendations

1. **INTRODUCTION**

The family Canidae composed of 34-36 living species (domestic dogs, wolves, foxes, jackals and dingos)

Some of the African Canids includes:

African wild dog (*Lycaon pictus*)

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Ethiopian wolf (Canis simensis)

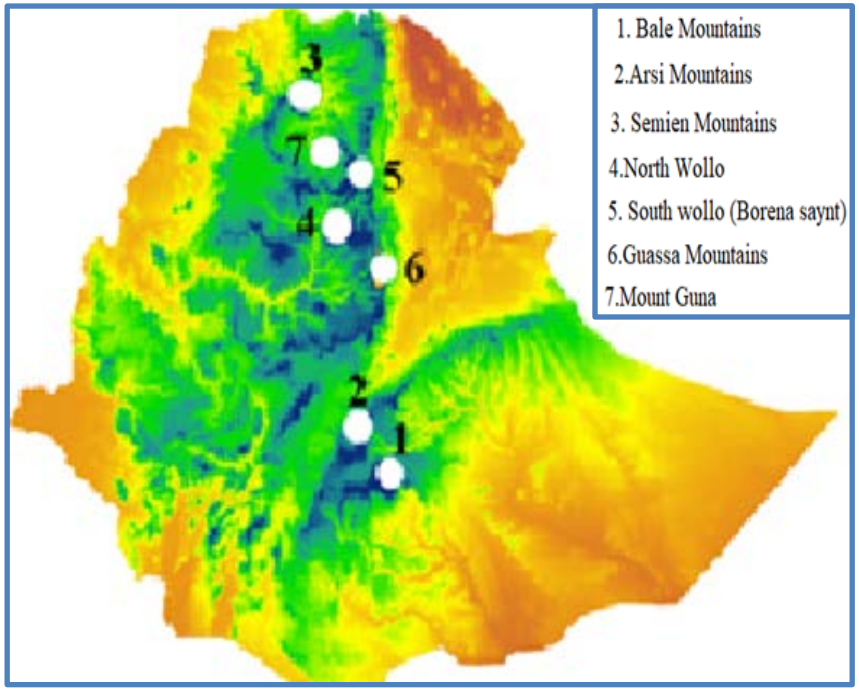

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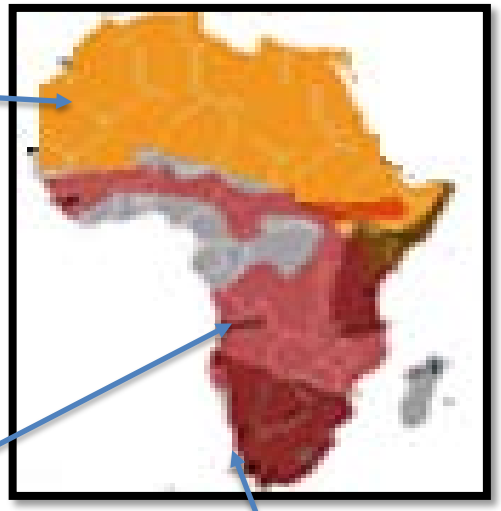
Fig. Distribution of Ethiopian wolves (Marino and Sillero-Zubiri 2011)

- Distribution in Africa

African wolf (*C.lupaster*)



Side-striped jackal (*C. adustus*)

(Fuller *et al*. 1989)

Black-backed jackal (C. mesomelas)

- African wolf (AW) is the most recently discovered mammal species in Africa (Rueness et al. 2011)

  - It was confused with Eurasians golden jackals (*Canis aureus;)*

African wolf (*C.lupaster*)

Golden jackals (*Canis aureus)*

Fig. Cryptic species (African and Eurasians golden jackals; Kopple *et al*. 2015)

Intro…

- Recent studies confirmed that the African golden jackals are wolves

Rueness *et al*. 2011
Gaubert *et al*. 2012
Kopple *et al*. 2015
Viranta *et al*. 2017

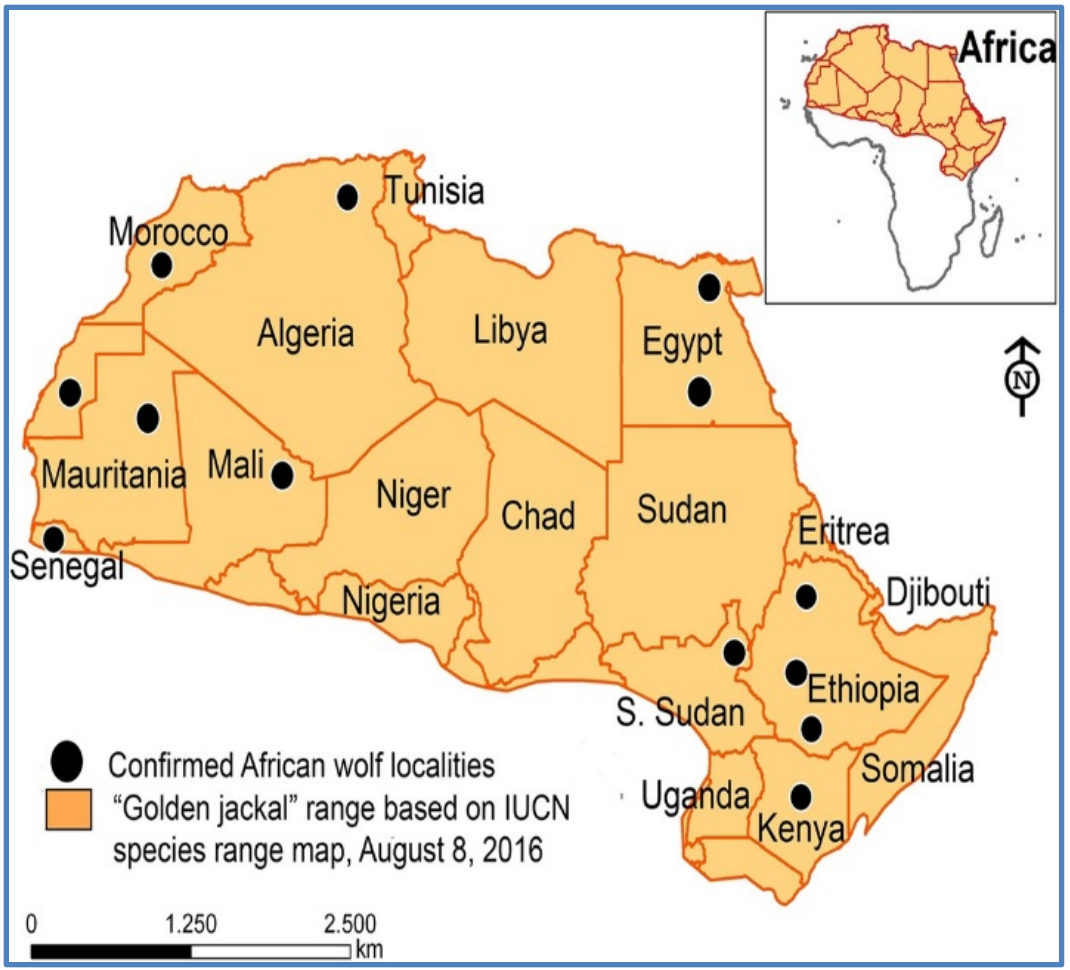


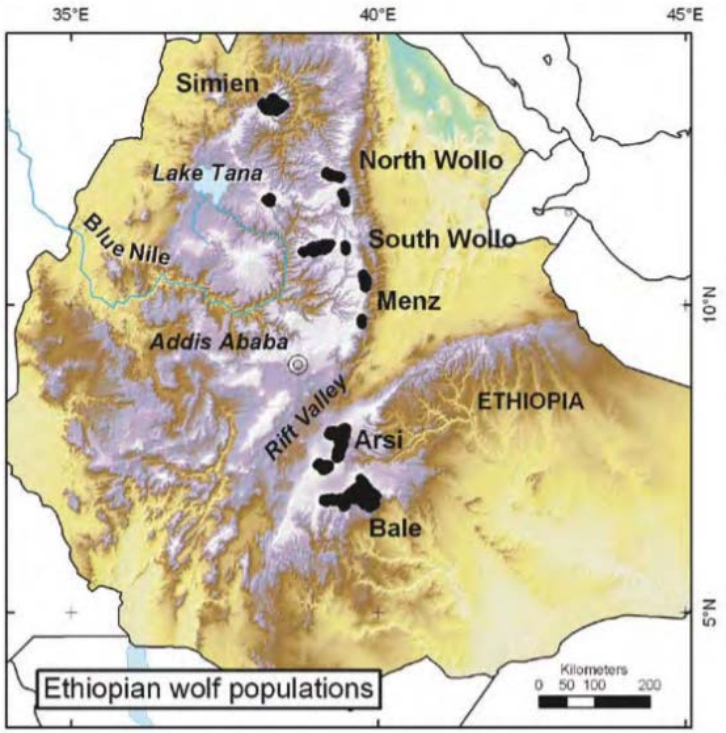
Fig. Confirmed African wolf localities (Viranta etal. 2017)

- In lowlands of East Africa, AWs coexist with Side-striped and Black-backed jackals through resource partitioning.

- When coexist:

- Side- striped jakals use open woodland and nocturnal
- Black-backed jackals use closed woodland / active at dawn
- AWs uses grassland and diurnal

- In the Ethiopian highlands AWs coexist with the endangered Ethiopian wolves



- Habitat specialist
- Rodent specialist
- < 500 individuals

Fig. Distribution of Ethiopian wolves (Marino and Sillero-Zubiri 2011)

- Anthropogenic impacts disrupting the coexistence of carnivore species (Sinclair and Dobson 2015).

- Habitat fragmentation and overgrazing increases interspecific competition

- Interference competition
  - Direct, antagonistic
- Exploitative competition
  - Indirect, limited resources

Fig. Livestock in buffer habitat at Guassa Community Conservation Area.

2. AIM OF THE STUDY

- To document the behavioral ecology of AWs and to investigate the extent of competition among AWs and EWs

Specifically to:

- evaluate the extent of competition between AWs and EWs,
- investigate the foraging behavior of AWs
- determine the home range, activity, and habitat use of AWs
- investigate the status of human-carnivore conflict

3.GENERAL METHODOLOGY

Study area

Guassa Community Conservation Area

- Area = 111 km2
- Elevation = 3,200 – 3,700 m

Borena Saynt National Park

- Area= 153 km2
- Elevation= 1,900 – 3,700 m.

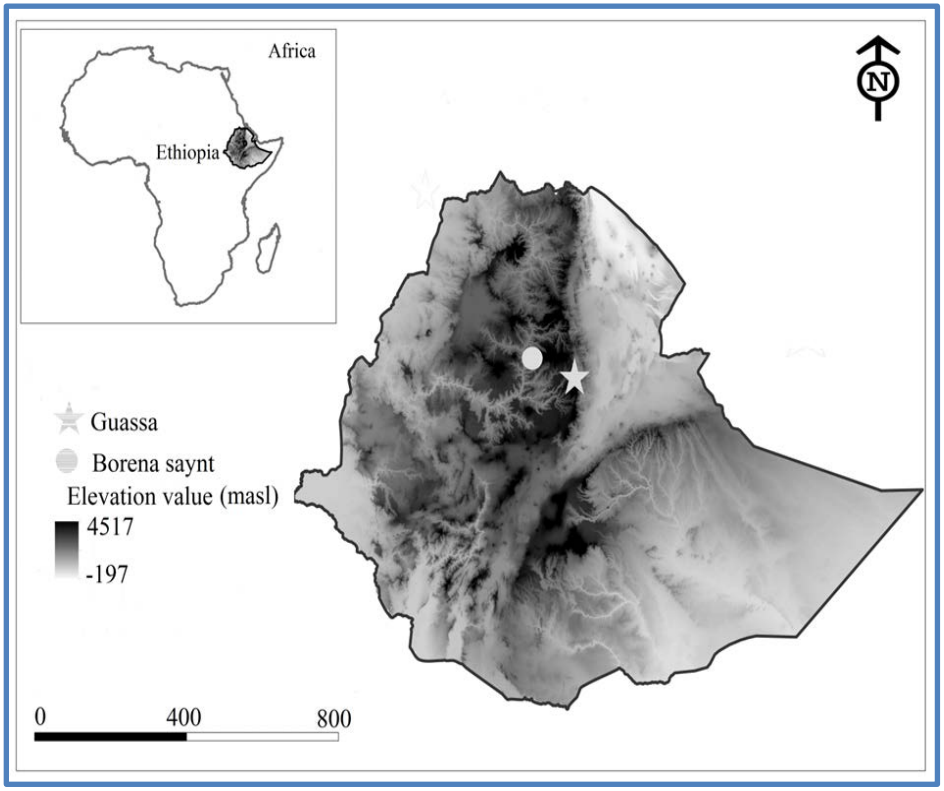


Fig. The study area

- We divided the study area into core, buffer & matrix

- *Core* (all human and livestock activities are prohibited).
- *Buffer* (controlled livestock grazing is permitted).
- *Matrix* (human-dominated areas adjacent to the protected area).

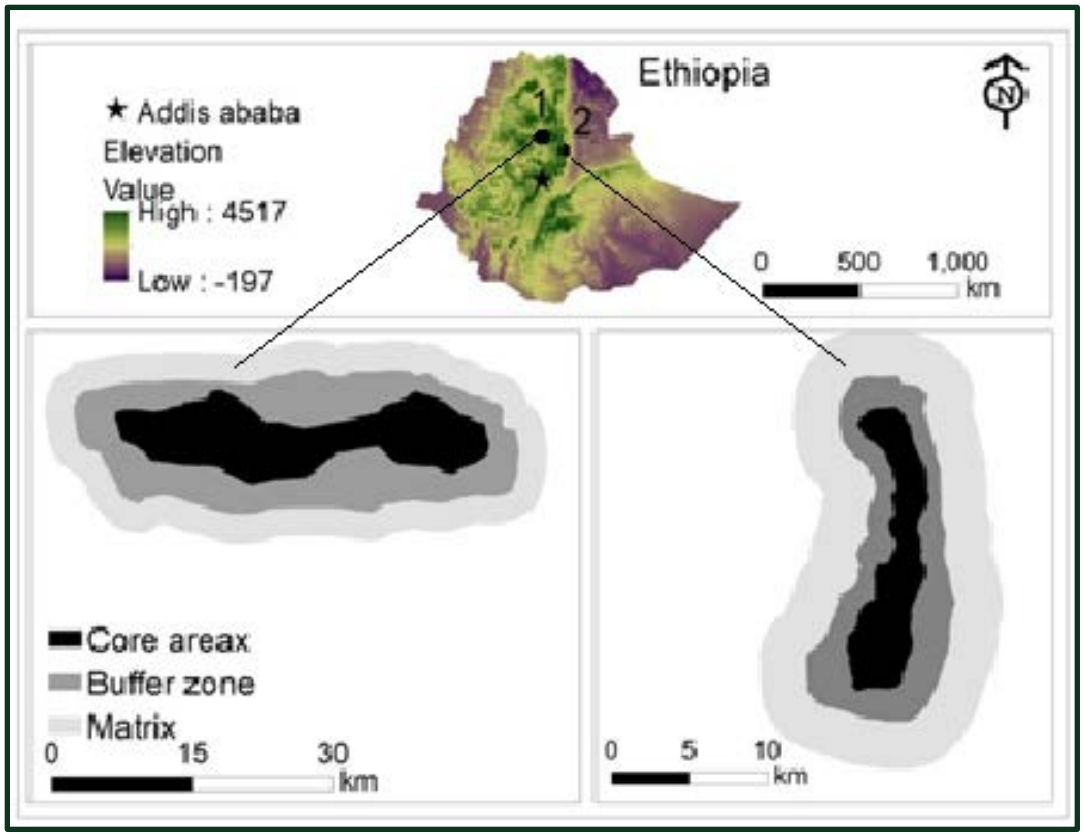


Fig. Three division of Study areas

Methods

- We collared 14 AWs using rubber-lined foothold traps and tracked for 16 months

Fig 8. Immobilizing collaring and tracking of African wolves

method…

- GPS locations to analyze home range and distribution
- Scat analyses to evaluate diet overlap (Paper I, IV)
- Small mammals trapping (Paper I and II)
- Direct observation (paper II)

4. PAPERS

Paper I

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Research

Cite this article: Gutema TM *et al*. 2018 Competition between sympatric wolf taxa: an example involving African and Ethiopian wolves. *R. Soc. open sci.* **5**: 172207. http://dx.doi.org/10.1098/rsos.172207

Received: 17 January 2018
Accepted: 22 March 2018

Competition between sympatric wolf taxa: an example involving African and Ethiopian wolves

Tariku Mekonnen Gutema[1,2], Anagaw Atickem[3], Afework Bekele[4], Claudio Sillero-Zubiri[5,6], Mohammed Kasso[4], Diress Tsegaye[7], Vivek V. Venkataraman[8], Peter J. Fashing[9], Dietmar Zinner[3] and Nils C. Stenseth[1,4]

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Paper I

Objectives

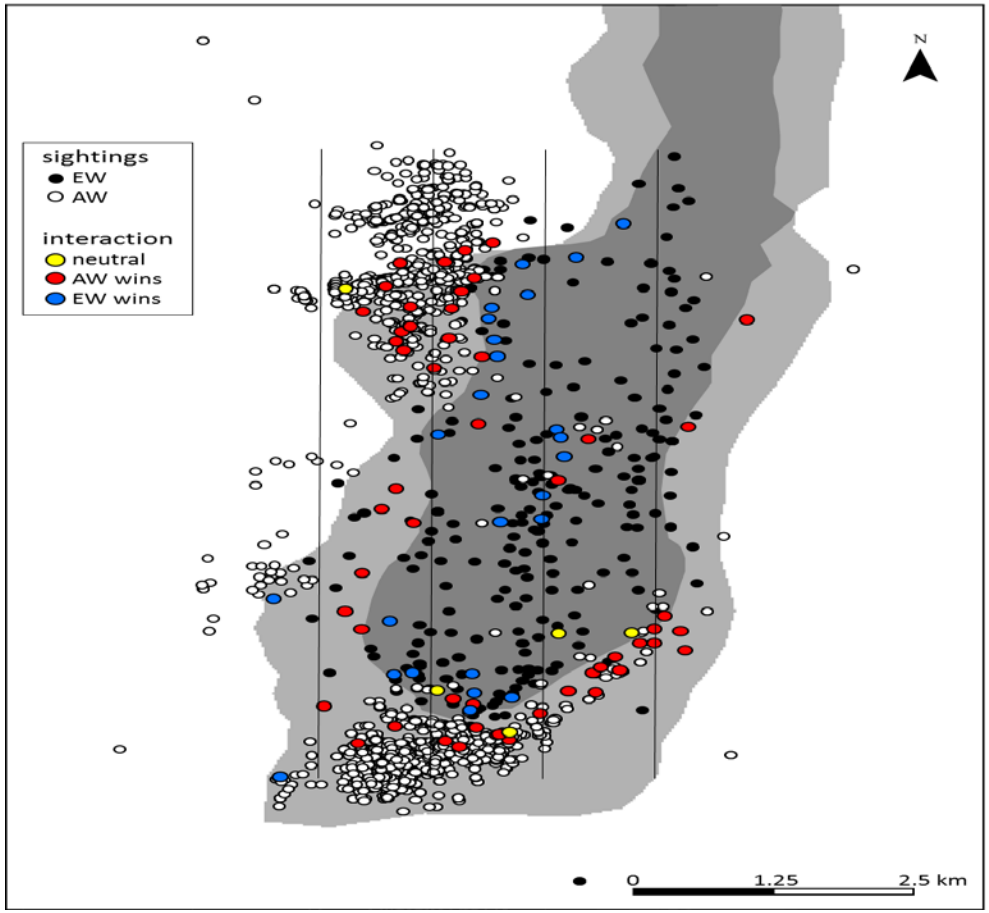
- To assess the extent of competition between AWs and EWs
- To evaluate habitat quality in the buffer and core zone.

Methods

- **Distribution**: GPS recorded
- **Competition**: recording nature of the interaction (neutral, aggression and bite)
- **Diet overlap**: Scat analyses

Results and Discussion

- AWs inhabit the buffer and while EWs the core.



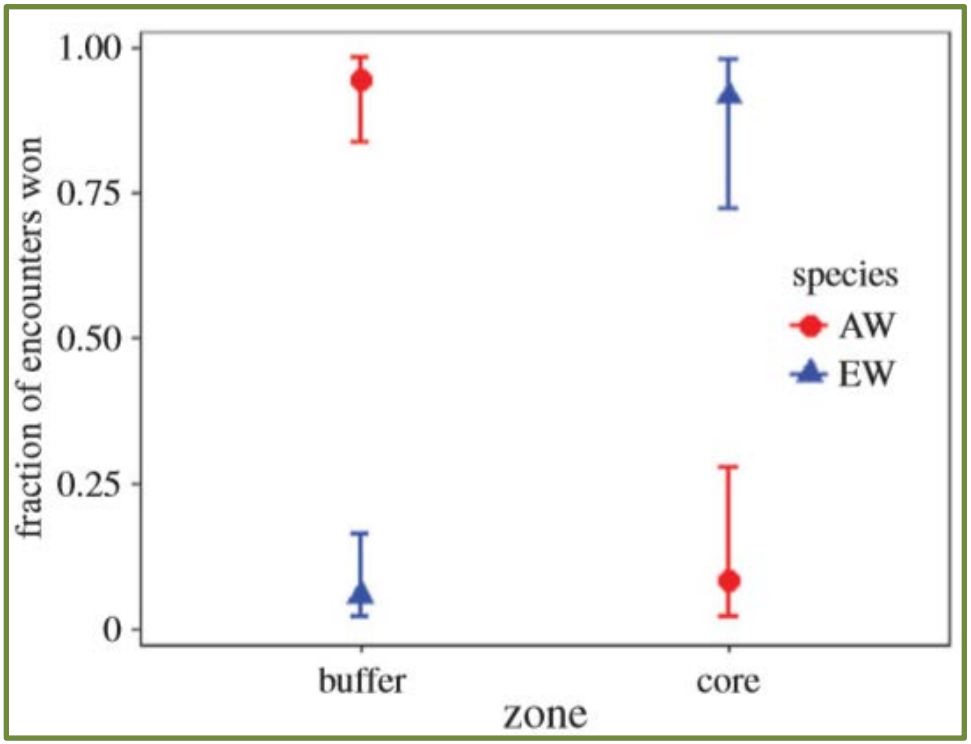
AWs
- Buffer and matrix = 98 %
- Core= 2%

EWs
- Core =82.4%
- Buffer =18.6%

Interaction:
- Agonistic=93.9%(N=82)
- Neutral (6.1%),
- Interference competition

Fig. 2. Southern section of the GCCA, including transects (vertical lines) and sighting locations of Aws and EWs.

- The species winning the interaction depended on the site and group size of AWs.



Dominance depends on the territory

- AWs in the Buffer
- EWs in the Core

Fig 3. Fraction of agonistic encounters won by Aws and Ews in relation to encounter locations (buffer zone versus core area).

Group size helped AWs to win some contests

Table 1. Estimates of probability of the AW versus EW winning encounters in core area versus buffer zone. 'Buffer zone' was used as a reference level in the analysis.

effects	estimate	s.e.	*Z*	*p*
intercept	1.150	1.808	0.636	0.250
site (core versus buffer)	−8.971	3.043	−2.948	0.003
AW group size	3.171	1.295	2.449	0.014
EW group size	2.001	1.300	−1.590	0.124

Summary paper 1

- AWs inhabit in the buffer while EWs in the core zone
- There is interference competition between AWs and EWs
- Territory and group size are important for dominancy

PAPER II

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Research

Cite this article: Gutema TM *et al.* 2019 Foraging ecology of African wolves (*Canis lupaster*) and its implications for the conservation of Ethiopian wolves (*Canis simensis*). *R. Soc. open sci.* **6**: 190772.
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Subject Category:
Biology (whole organism)

Subject Areas:
ecology/behaviour

Keywords:
African wolf, ecosystem services, Ethiopian highlands, Ethiopian wolf, feeding ecology, pest rodents

Foraging ecology of African wolves (*Canis lupaster*) and its implications for the conservation of Ethiopian wolves (*Canis simensis*)

Tariku Mekonnen Gutema[1,3], Anagaw Atickem[4,5], Diress Tsegaye[2], Afework Bekele[5], Claudio Sillero-Zubiri[6,7], Jorgelina Marino[6,7], Mohammed Kasso[5], Vivek V. Venkataraman[8], Peter J. Fashing[1,9] and Nils C. Stenseth[1,5]

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Paper II

Objectives

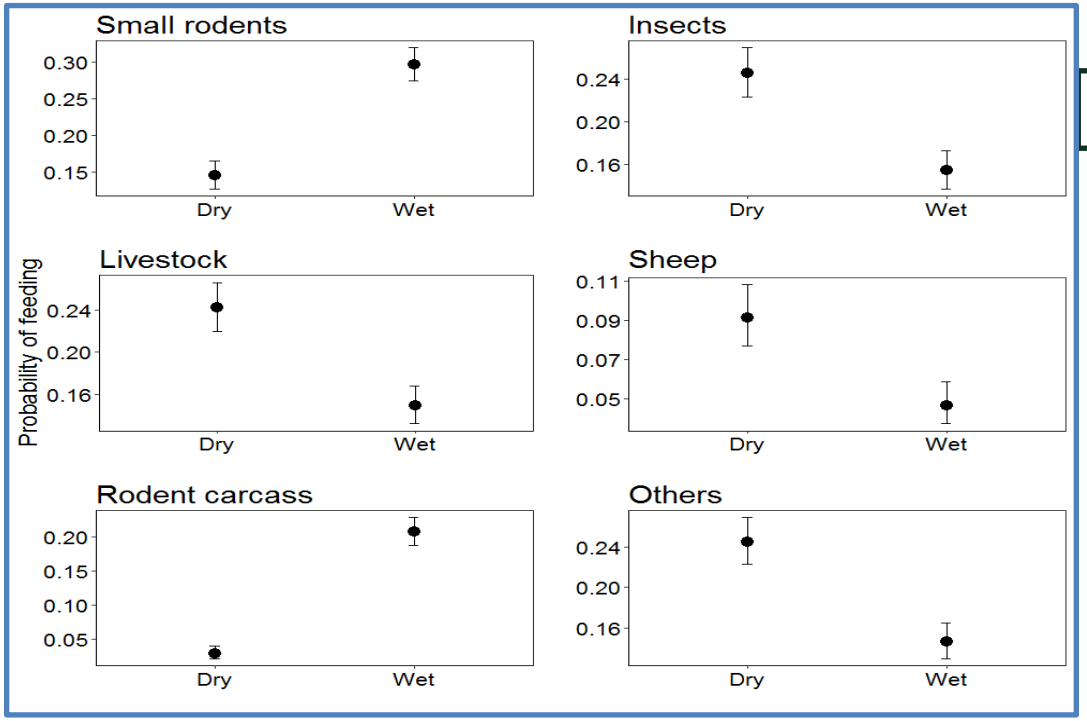
- AWs diet that derived from scavenging versus active hunting
- AWs foraging in farmland versus natural habitat rodent trapping activity by local farmers

Methods

- Feeding activities (scavenging vs active hunting)
- Successful and unsuccessful feeding attempts
- The number and species of rodents trapped by 'difit'

Results and Discussion

- AW is an opportunistic forager and regularly scavenging



AWs feeding on rodents

N=491

Predation 28%

Scavenging 72%

Fig. Probability of African wolves feeding on d/t diets in the dry & wet seasons.

Result…

- Aws success rates of capturing rodents increases in the Farmland (36%)
  Others (<17%)

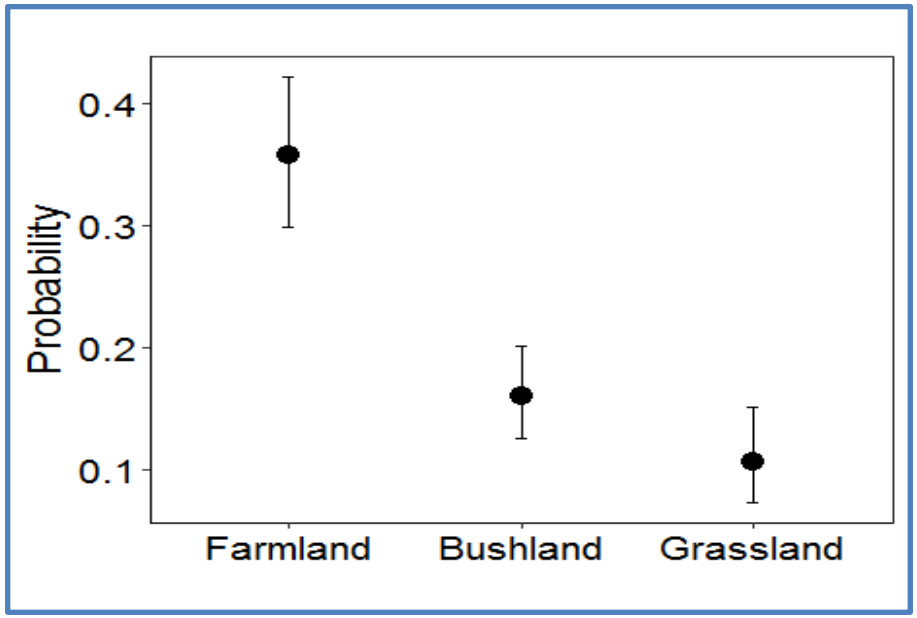


Fig. 4. Probability of African wolves successfully capturing rodents.

Summary paper II

The study showed that

- A large proportion of the rodents in AWs were from dead animals,
- Exploitative food competition between the AW and EW would be limited.
- The importance of AWs in rodent pest control and waste management

PAPER III

Ranging, habitat, and activity patterns of African wolves (*Canis lupaster*) in two landscapes of the Ethiopian Highlands.

(Manuscript)

Gutema, T. M., Atickem, A., Tsegaye, D., Chala, D., Bekele, A., Sillero-Zubiri, C., Marino, J., & Stenseth, N. C. (?).

Objectives

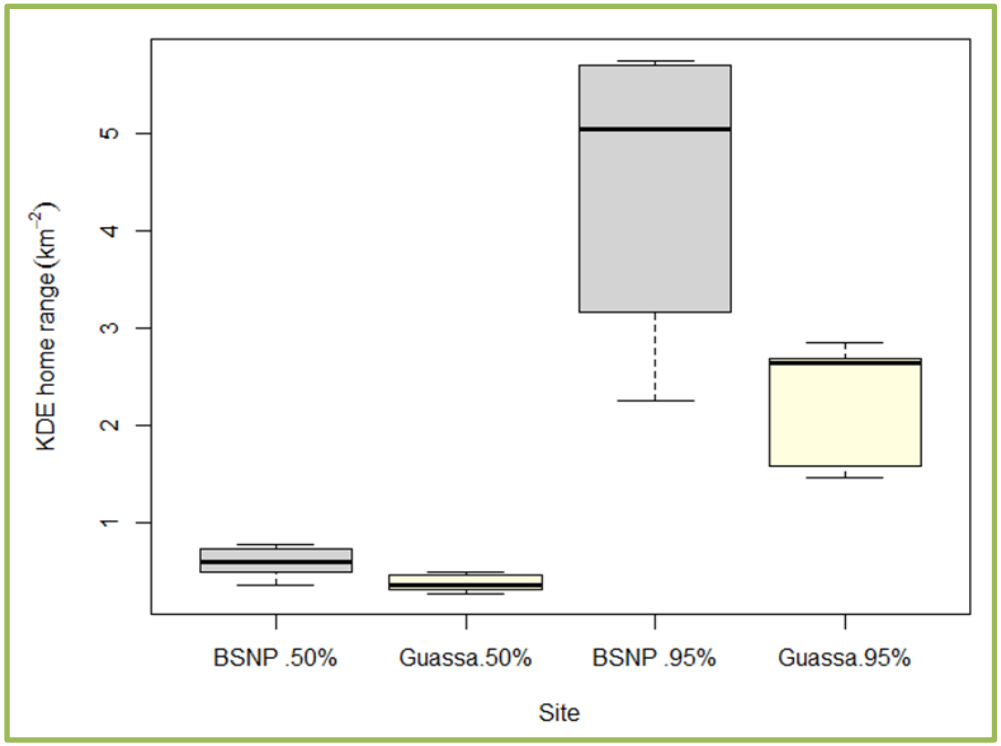
- To determine the home range size, habitat use and activity patterns in two study sites

Methods

- Home range size was estimated using MCP and KDE
- We recorded activities as travelling, resting, hunting and feeding

Results and Discussion

- Significant variation in AW home range sizes in different landscapes



Home range size (95% KDE)

- **BSNP** = 4.5 +1.5 km2
- **GCCA** =2.2 +0.7 km2

Fig 3. Comparison of mean ± SD 95% and 50% KDE home range sizes (km^2) of AWs

AWs habitat Use,

- Mostly bushland... during the day,
- farmland and open grassland during the night

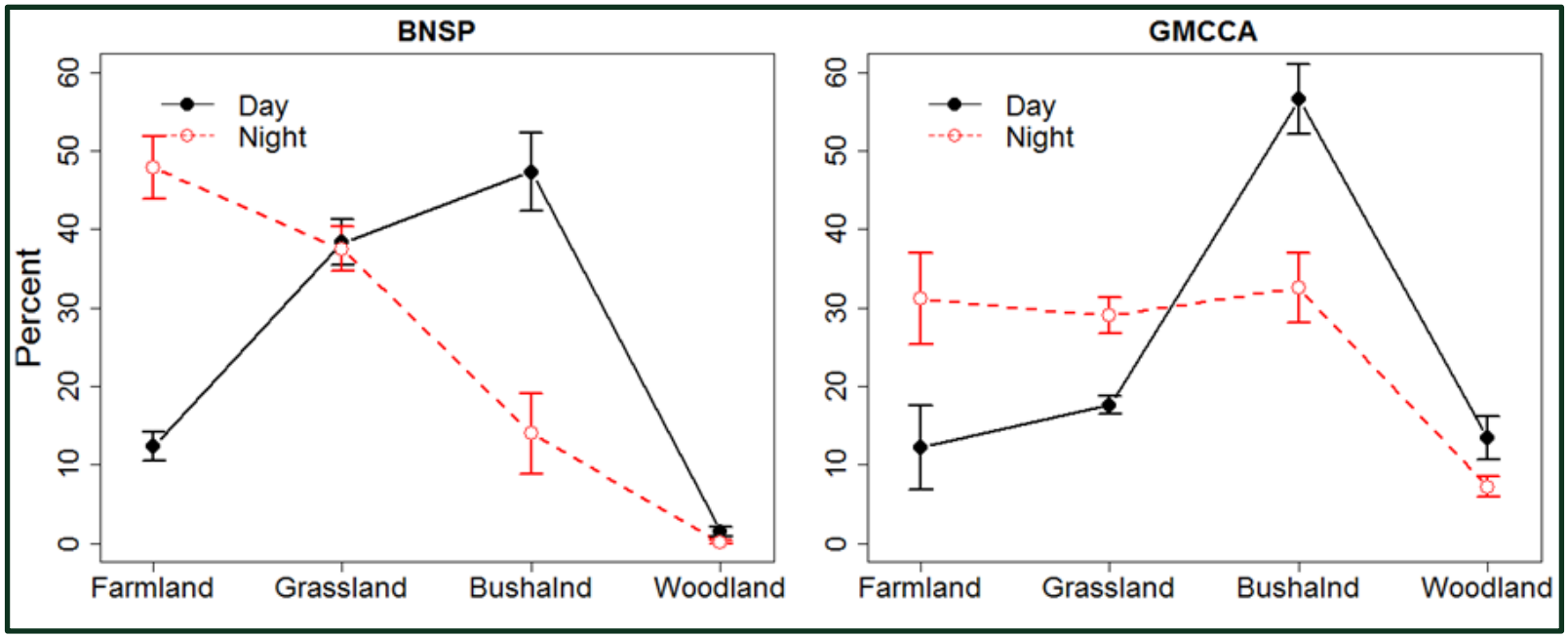
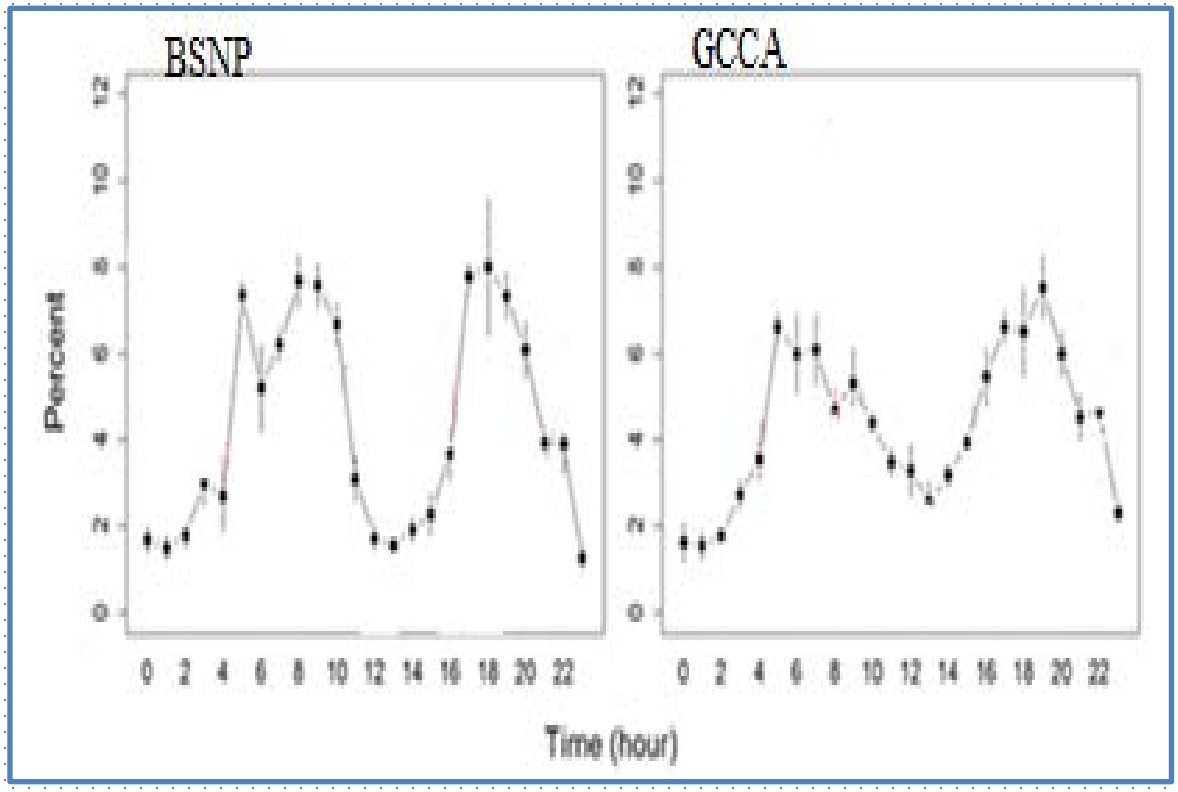


Fig: Mean percentage time spent by AWs in different habitat types

- AWs activity peaks was at dawn and dusk

- **04:00 --10:00 (dawn)**
- **16:00-20:00 (dusk)**

- EWs were active during a day (Ashenafi et al., 2005)



Percentage of active time of AWs in BSNP and GCCA

Summary Paper III.

- The extent of AWs and EWs niche partitioning that allow them for coexistence.
- The plasticity of AWs and their ability to respond to human-induced landscape changes.

PAPER IV

African Journal of Ecology

Original Article

African wolf diet, predation on livestock and conflict in the Guassa mountains of Ethiopia

Anagaw Atickem, Getachew Simeneh, Afework Bekele, Tariku Mekonnen, Claudio Sillero-Zubiri, Russell A. Hill, Nils Chr. Stenseth

First published: 24 April 2017 | https://doi.org/10.1111/aje.12399 | Citations: 4

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Abstract

EN FR

The African wolf (*Canis lupus lupaster*) was first identified in 2011 in the Ethiopian highlands, with its status as a new species confirmed in 2015. We studied the diet of a confirmed African wolf population in the Menz-Guassa Community Conservation Area of central Ethiopia from scat samples collected by den sites from August to November 2010. Rodents were found to be the principal food items occurring in 88.1% of scats (n = 101), followed by plant material (34.7%) and insects (21.8%). Information on reported livestock predation and ensuing conflict with the agro-pastoral community was obtained through

Paper IV

Objective

- To asses the level of human -African wolf conflict

Method

- A questionnaire survey of 250 local communities in 3 years
- Scat analyses (n = 101)

Results

- AWs were the most livestock predator in the GCCA (74.6%, n = 492)
- Highest economic losses by AWs (78.9%, of the total)
- The community had negative attitudes toward the AWs (80%)
- Only 14 % negative attitude toward Ews.

February to April were the highest predation season

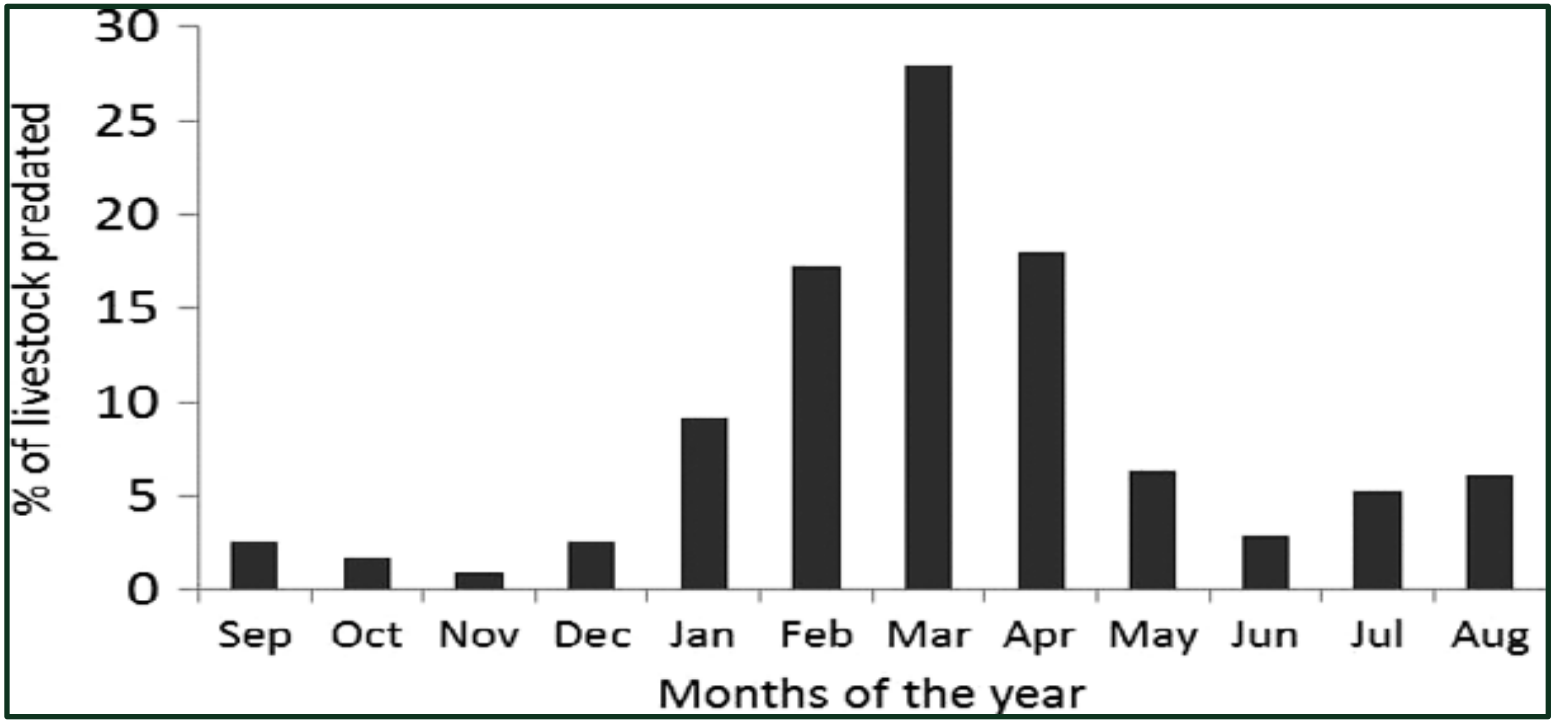

Fig 2 Livestock depredation rate across different months of the year

5. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

African wolves

- Can be a threat to the EWs through interference competition,
- Omnivorous diet with a prominent scavenging ,

- Home range sizes are flexible based on landscape;
- involved on serious human-predator conflict,
- important in ecosystem service role

Recommendations

- Reducing human encroachment and habitat loss
- Protection of intact habitats to preserve habitat preferred by EWs
- Increasing local community awareness about the value of AWs in rodent pest controll
- Focusing on mitigation measures to reduce carnivore-human conflict

6.Project in Progress

6.1 Population status and reproduction ecology of African wolves

- Estimating the population of AWs using call-up methods in four Ethiopian Highlands
- Reproduction ecology: study of den sites, pups number and activities,

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- Dr. Anagaw Atikem,

Others:

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- Ethiopian Wildlife Conservation Authority
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- Colleagues
- Families


THANK YOU