

The Benefit of Studying Ecosystems at Namibian Airports

Morgan Hauptfleisch, Dirk Bockmühl, Christa D'Alton and Nico Avenant

*Department of Agriculture & Natural Resources Sciences, Polytechnic of Namibia
National Museum, Bloemfontein, South Africa
Centre for Environmental Management, University of the Free State*



Study sites



✈ Hosea Kutako International Airport ✈ Eros Airport — Country borders

Base image: Google Earth (2013)

The study objectives

- Look at ecosystem condition, productivity and services and their influence on wildlife strikes.
- Ecosystem parameters considered:
 - Small mammals (rodents, mice, etc.)
 - Arthropods (insects, spiders, etc.)



Study sites



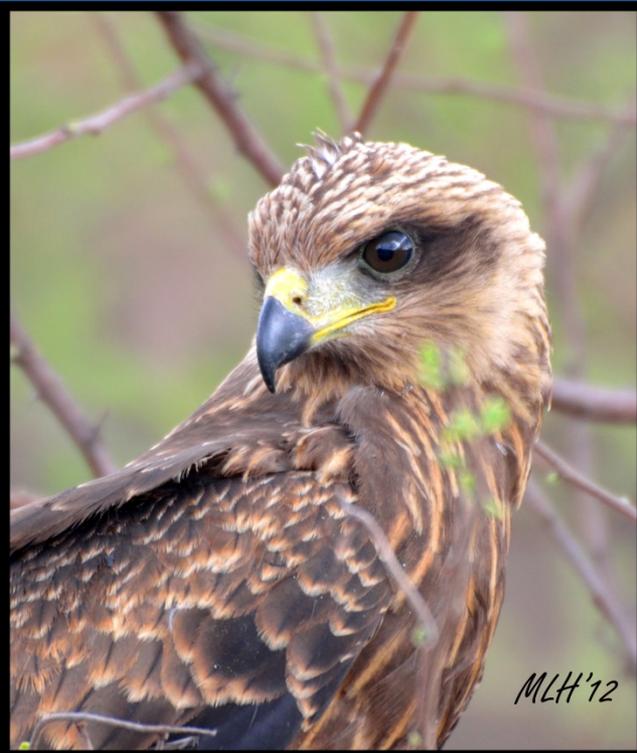
Transect 

Airport perimeter fence 

Aerial Image: Google Earth (2005)

Why look at small mammals and arthropods?

- Important prey species;
- Indicators of ecosystem condition and integrity.



Collisions reported 2006-2010	Hosea Kutako Airport		Eros Airport	
Small mammals as prey	Number	%	Number	%
Large (>1000 g)				
Helmeted Guinea Fowl (<i>Numida meleagris</i>)	5	16.7	6	9.1
Yellow-billed Kite (<i>Milvus aegyptius</i>)	3	10.0	2	3.0
Secretary Bird (<i>Sagittarius serpentarius</i>)	3	10.0	0	0
Marabou Stork (<i>Leptoptilos crumeniferus</i>)	2	6.7	0	0
Abdim's Stork (<i>Ciconia addimii</i>)	2	6.7	0	0
White-backed Vulture (<i>Gyps africanus</i>)	1	3.3	0	0
Medium (300-1000 g)				
Southern Pale Chanting Goshawk (<i>Melierax canorus</i>)	1	3.3	1	1.5
Black Crow (<i>Corvus capensis</i>)	1	3.3	0	0
Rock Dove (<i>Columbia livia</i>)	0	0	2	3.0
Small (<300 g)				
Rock Kestrel (<i>Falco rupicolus</i>)	2	6.7	0	0
Crowned Lapwing (<i>Vanellus coronatus</i>)	9	30.0	51	77.4
Sparrow (Family Passeridae)	0	0	2	3.0
Swallow/swift (Family Hirundinidae, Apodidae)	0	0	1	1.5
Burchell's Courser (<i>Cursorius rufus</i>)	1	3.3	1	1.5
Total	30	100	66	100

Collisions reported 2006-2010	Hosea Kutako Airport		Eros Airport	
Arthropods as prey	Number	%	Number	%
Large (>1000 g)				
Helmeted Guinea Fowl (<i>Numida meleagris</i>)	5	16.7	6	9.1
Yellow-billed Kite (<i>Milvus aegyptius</i>)	3	10.0	2	3.0
Secretary Bird (<i>Sagittarius serpentarius</i>)	3	10.0	0	0
Marabou Stork (<i>Leptoptilos crumeniferus</i>)	2	6.7	0	0
Abdim's Stork (<i>Ciconia addimii</i>)	2	6.7	0	0
White-backed Vulture (<i>Gyps africanus</i>)	1	3.3	0	0
Medium (300-1000 g)				
Southern Pale Chanting Goshawk (<i>Melierax canorus</i>)	1	3.3	1	1.5
Black Crow (<i>Corvus capensis</i>)	1	3.3	0	0
Rock Dove (<i>Columbia livia</i>)	0	0	2	3.0
Small (<300 g)				
Rock Kestrel (<i>Falco rupicolus</i>)	2	6.7	0	0
Crowned Lapwing (<i>Vanellus coronatus</i>)	9	30.0	51	77.4
Sparrow (Family Passeridae)	0	0	2	3.0
Swallow/swift (Family Hirundinidae, Apodidae)	0	0	1	1.5
Burchell's Courser (<i>Cursorius rufus</i>)	1	3.3	1	1.5
Total	30	100	66	100

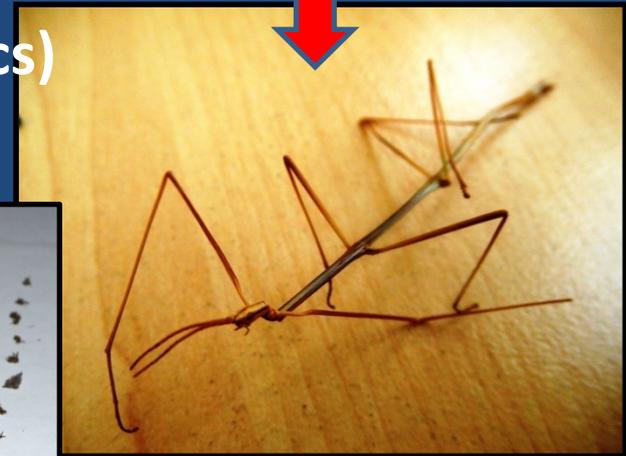
Methodology – small mammals

- Transects of 100 traps spaced 5m;
- Baited for 4 trap nights, checked twice daily;
- Twice per year (end of growing and non-growing season) for two consecutive years (2011 and 2012);
- Mark-recapture;
- Determined abundance, species richness, diversity (Shannon Diversity Index);
- Compared using standard non-parametric paired tests.



Methodology – Arthropods

- Collection
- Sweep netting
- Analyses
 - Arthropods (insects & spiders) separated from plant matter
 - Sorted into orders, counted & weighed
 - ANOVA & Pearson's correlation (Statistics)
 - Results related to birdstrike-risk at HKIA

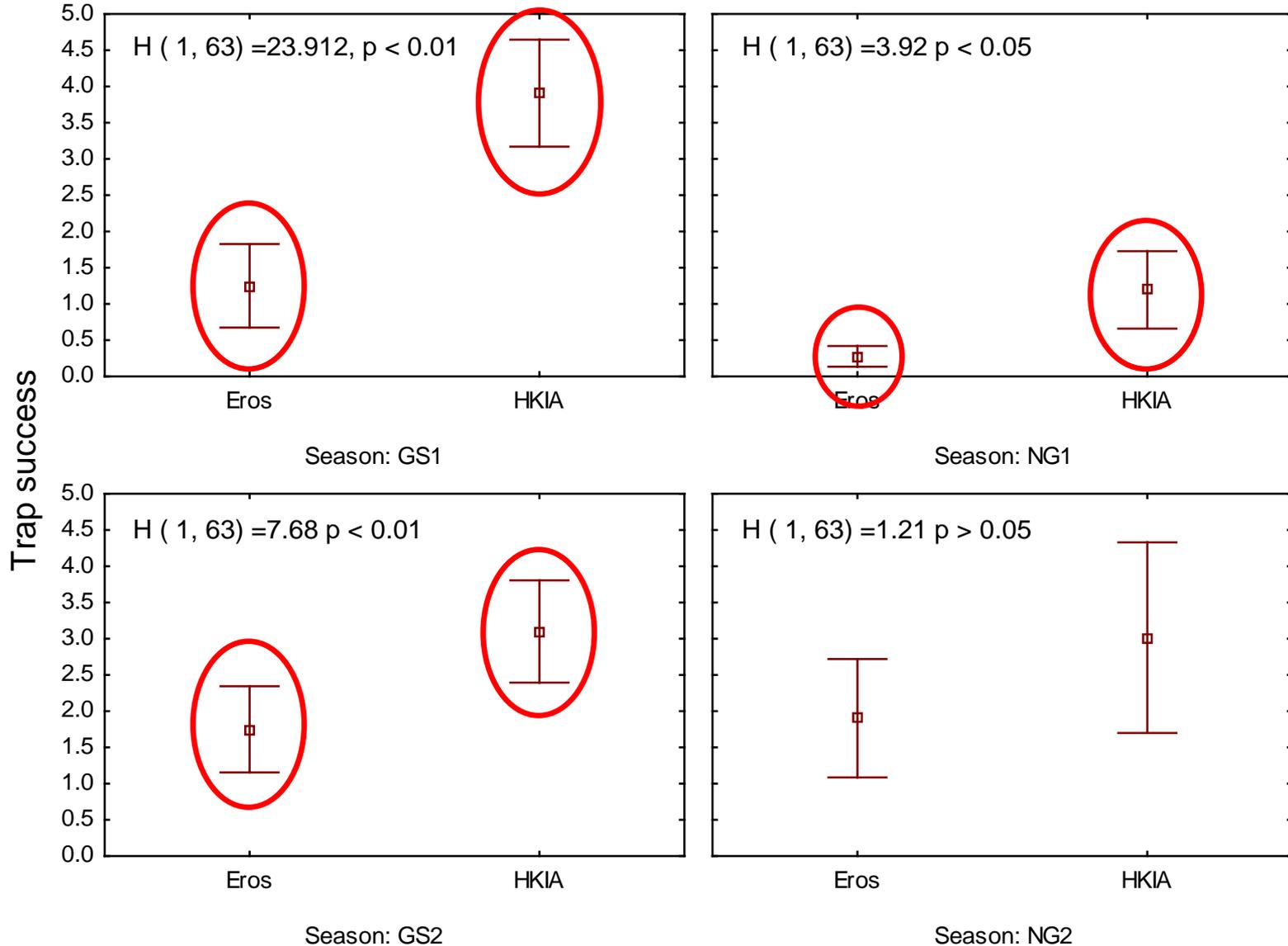


Results – Small Mammal Abundance

- Trapped a total of 2150 individuals;
 - 1570 at Hosea Kutako (rural)
 - 580 at Eros (urban)
- 1317 during the growing season (GS1 and GS2)
- 833 in the non-growing season (NG1 and NG2)

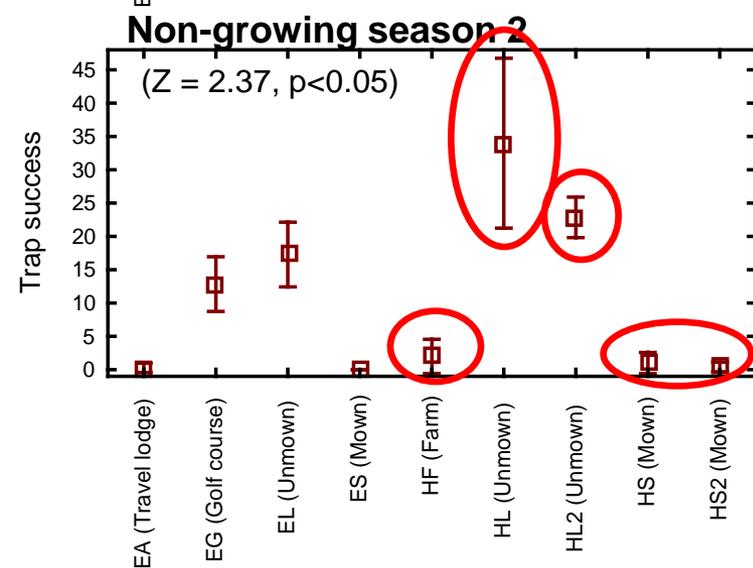
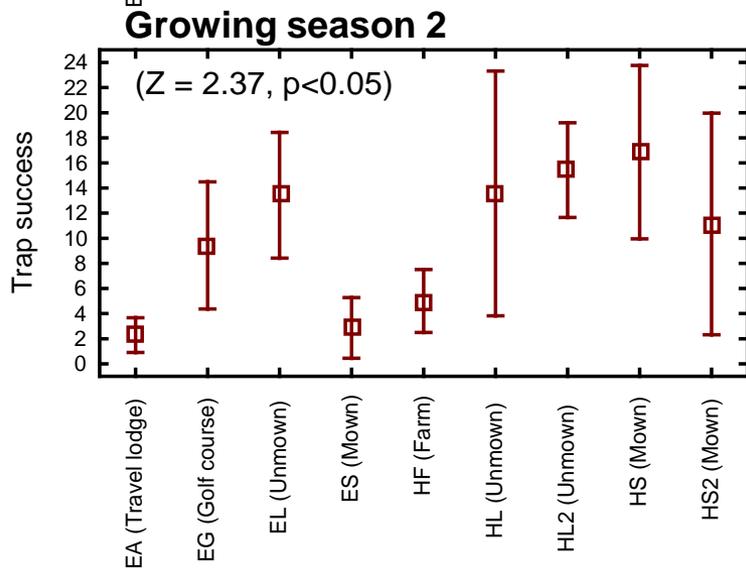
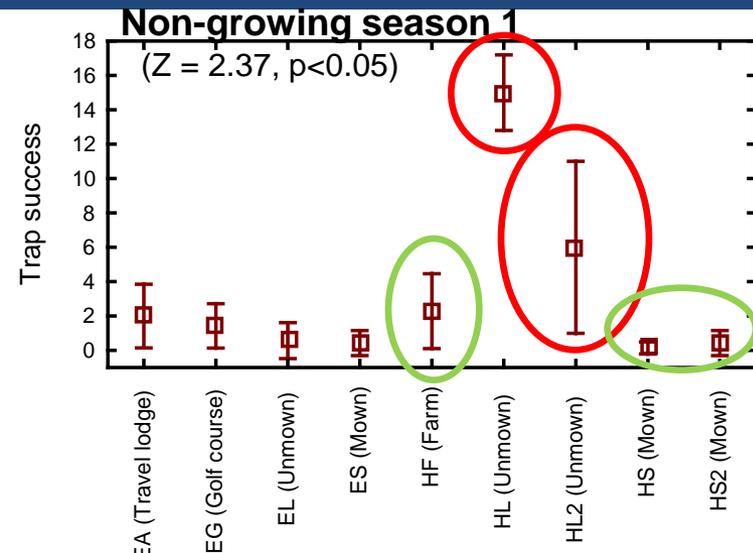
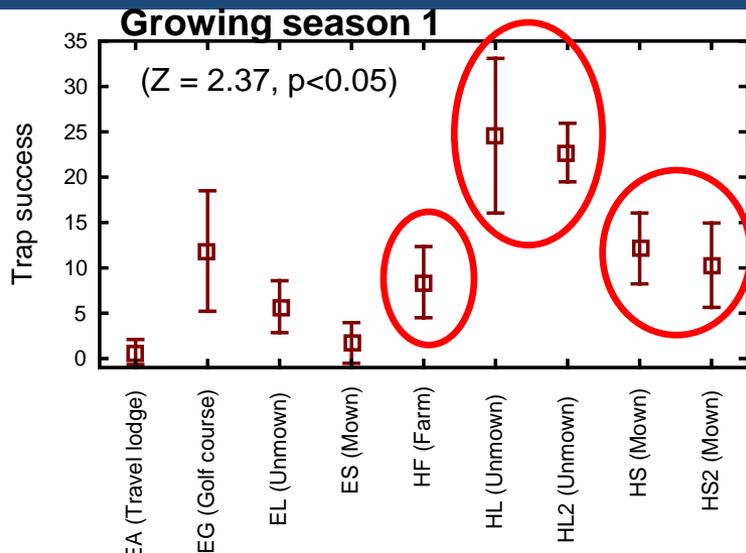


Results – Small mammal abundance per airport



Results – Small mammal abundance per transect

(mean number trapped +/- 95% confidence interval per trap night)

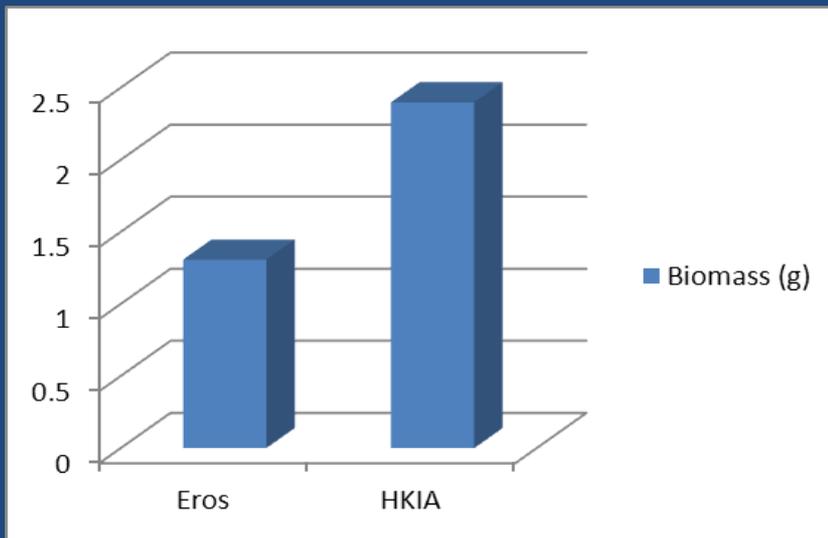


Results – Small mammal species richness

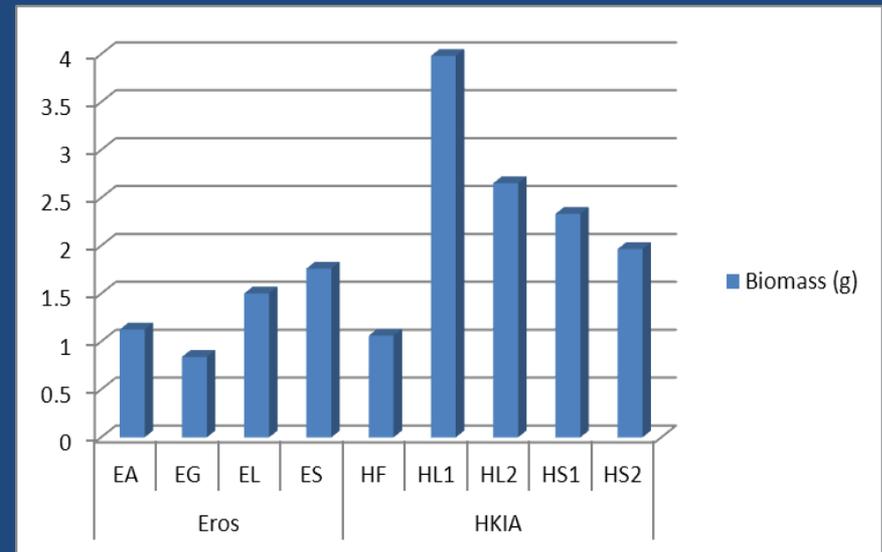
Order	Species	Hosea Kutako	Eros
Rodentia	<i>Desmodillus auricularis</i>	Present	Present
Rodentia	<i>Mastomys coucha</i>	Dominant (noct.)	Dominant (noct.)
Rodentia	<i>Mus musculus</i>	Present	<u>Absent</u>
Rodentia	<i>Mus indutus</i>	Present	Present
Rodentia	<i>Rhabdomys pumilio</i>	Dominant (diurn.)	Dominant (diurn.)
Rodentia	<i>Saccostomus campestris</i>	Present	Present
Rodentia	<i>Gerbilliscus leucogaster</i>	Present	Present
Rodentia	<i>Thallomys paedulcus</i>	<u>Absent</u>	Present
Macroscelidea	<i>Elephantulus intufi</i>	Present	Present
Eulipotyphla	<i>Crocidura sp. 1</i>	Present	<u>Absent</u>
Eulipotyphla	<i>Crocidura sp. 2</i>	Present	<u>Absent</u>
Total species richness	11	10	8

Results - Arthropods

- 45 451 individuals collected
- 14 orders



Mean biomass (g) yield/transect/airport ($p=0.00505$)

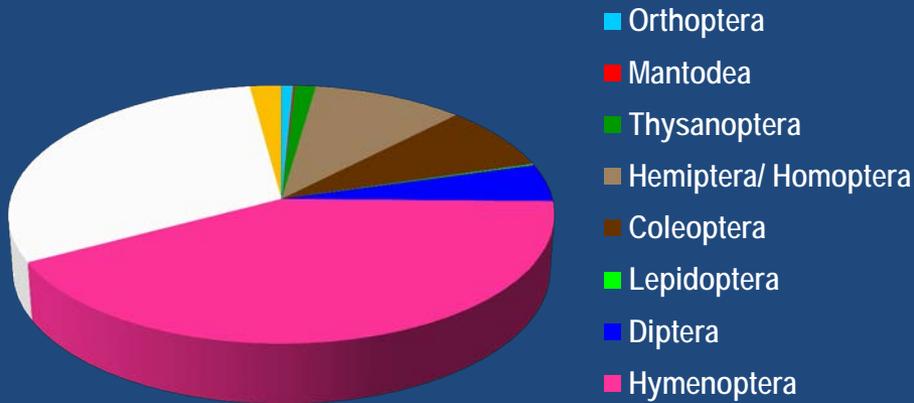


Mean biomass (g)/transect ($p=0.00186$)

Results - Arthropods

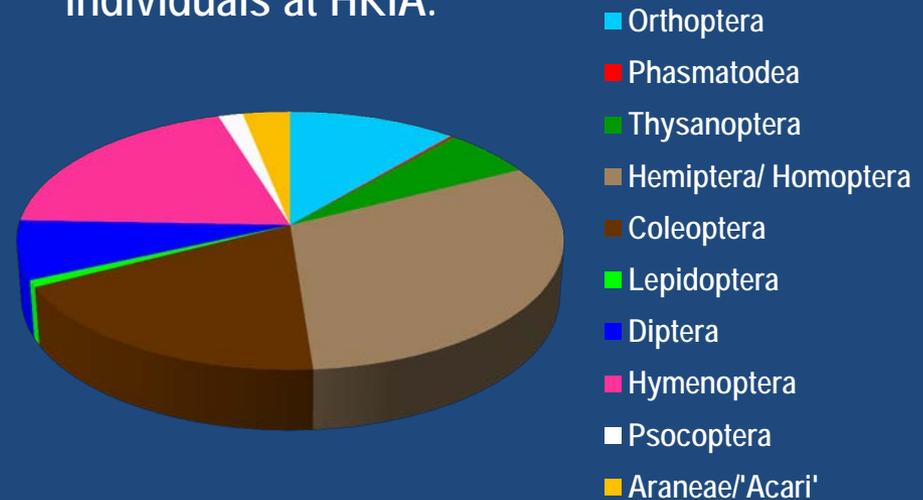
Percentage contribution of top ten orders in terms of numbers of individuals at Eros.

At Eros: ~42% Hymenoptera



Percentage contribution of top ten orders in terms of numbers of individuals at HKIA.

At HKIA: ~31% Hemiptera



Discussion

- Dominant diurnal small mammal *R. pumilio* is an important prey species for raptors found to frequent both airports – and is therefore an attractant:
 - Black-shouldered Kite (*Elanus caeruleus*), Yellow-billed Kite (*Milvus aegyptius*), Rock Kestrel (*Falco tinnuculus*), Greater Kestrel (*Falco rupicoloides*), Southern Pale-chanting Goshawk (*Melierax canorus*) and Secretarybird (*Sagittarius serpentarius*).





Discussion



- Rurally situated Hosea Kutako has a higher abundance and diversity of small mammals (influences future airport planning), and a higher biomass of arthropods;
- Hosea Kutako acts as sanctuary (fenced off, no grazing, no predators) when compared to surrounding farms;
- Mowing reduces small mammal abundance (but only if done completely and regularly);
- Mowing seems to reduce arthropod productivity (not conclusive);
- Partial or incomplete mowing creates areas of sanctuary.



Airport property

Farmland

Conclusion

- Small mammal abundance and diversity, and arthropod biomass, significantly higher at rural Hosea Kutako compared to Eros;
- Small mammal abundance and diversity significantly higher in growing season compared to non-growing season;
- Land use surrounding Hosea Kutako and mowing practices (to reduce bird collisions) attracts small mammals and arthropods – and hence raptors and insectivores;
- Species diversity is reduced with mowing, but not significantly.

Application for Aircraft-wildlife collision control

- Mowing of grass reduces small mammals and arthropods as prey for raptors, but only if complete (i.e. leaving no areas as sanctuary) and done regularly (twice a season).
- Surrounding land use has a significant impact on small mammal and arthropod abundance in the vicinity of airports, therefore planning processes for new airports must consider this.



Thank you for your attention

To subscribe to the WARN
newsletter send an e-mail to:
birdstrikenam@gmail.com



Please visit our website:
<http://warn.polytechnic.edu.na>

Wildlife & Aircraft Research Namibia (WARN) +264 81 124 1365

Pictures © Morgan Hauptfleisch