



Survey and distribution of weasels (Carnivora: Mustelidae) in popular and rural human habitats in Alexandria and Sohag Governorates

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Abstract:

The Egyptian weasel *Mustela subpalmata* Hemprich and Ehrenberg (Carnivora: Mustelidae) is omnivorous and includes vegetables and fruit in its diet as well as waste human food and animals. Under different human habitats in Alexandria and Sohag Governorates, Egyptian weasel , found in houses and streets of popular and rural habitats. The male rate was about 60% according to months, habitats and location. The abundance of weasels in Alexandria houses and streets more than Suhag's in both habitats. The higher index of weasels was recorded in rural human habitats and more disturbances could be found in the streets of both Governorates. In the winter months, weasels was limited in the streets while limited in houses during autumn months in rural habitats at both Governorates. In popular human habitats, weasel index limited to autumn months in streets and houses at the two Governorates. With high temperature months, weasels index increased earlier in Sohag compared with Alexandria and reached its peak in streets in summer and spring months in houses. Based on the previous results we can expect the disturbance weasels induces during high temperature months and could development suitable control program to get rid of weasels according to their abundance and distribution in houses and streets of rural and popular human habitats.

Introduction

The Egyptian weasel *Mustela subpalmata* Hemprich and Ehrenberg (Carnivora: Mustelidae) is a small mustelid with a distribution restricted to the lower Nile Valley and the Nile Delta. Traditionally considered a subspecies of the least weasel (*M. nivalis* L.), it is currently recognized as a separate species based on morphology (Rodrigues *et al.*, 2016) .The Egyptian weasel has

short legs, a small head and small ears. Its tail is long and thin. The description of Egyptian weasels was reported by McDonald and Hoffmann (2016). The atmospheric factors (temperature, humidity, wind and rain) and level of environmental hygiene an important role in the presence and spread of weasels (Samson and Raymoned ,1995) and Zalewski ,2000). Brandt and Lambin

(2005) studied the rhythm of activity of weasels in summer and mentioned that this is the prevailing rhythm found for weasels under natural conditions. They also found that, climatic condition influenced weasels' activity, with weasels decreasing activity under rainy conditions. In certain habitat, by pass levels of weasels' activity increased with increasing field vole *Microtus agrestis* (L.) (Rodentia : Cricetidae) density. Sundell *et al.* (2000) observed that the least weasel activity was highest at vole densities of 8 voles per ha. Moreover, declined at densities of 12 voles per ha., probably because hunting become more efficient the weasels belongs to order Carnivora (Canidae and Mustelidae) is distributed worldwide contains, more than 200 species. In particular Mustelidae consist of 64 extant species and for this reason, they are considered one of the most highly differently group of mammals (Hosoda *et al.*, 1993).

In Egypt (1980) Osborn and Helmy recorded weasels, *Mustela nivalis subpalmata* in Cairo, Alexandria and Fayoum Governorates, now the weasels can be seen easily in many habitats with its spread and increase numbers began to cause a lot of problems carrying serious human and animal diseases and feeding on small domestic animals and birds causing economic losses for home owners and breeders.

The aim of this work is to study the effect of temperature on weasel numbers in Alexandria and Sohag Governorates as well as the movement and survey of weasels in streets and houses in the popular and rural human habitats during year months

Materials and methods

Under the climatic conditions of the tested area in Alexandria 31.2°N 29.91667°E and Sohag 26°33'38"N, 31°41'30"E Governorates, the abundance of weasels was recorded monthly for two consecutive years (2017 and 2018) inside

houses and on the streets. Relative abundance of weasels was estimated as well as weasel's index (average number of weasels/trap/night) each year.

1. Tested area:

According to the different climatic conditions (average temperature, wind speed and sunny or cloudy days) between Alexandria and Sohag Governorates, poplar and rural human habitats were chosen in each Governorate.

1.1. Popular human area:

Two areas were chosen: El-Agamy 31° 5' 55.8132" N, 29° 45' 59.9976" E at Alexandria and Nag Abu Shagara 26° 32' 59.9964" N, 31° 42' 0.0036" E at Sohag Governorates. These popular areas consist of unregulated residential houses including shops selling poultry, meat and vegetables. The area are not crowded with little transportation and almost quiet at night. Poultry birds are raised on resident roofs residents, with much complains of bird's losses due to weasels attacks.

1.2. Rural habitats:

Two areas were chosen: El Ameriya 31° 6' 16.34" N, 29° 45' 58.42" E at Alexandria and in El-Maragha 26°40'51.2"N 31°37'45.5"E at Sohag Governorates. Rural habitats are informal dwellings close to canals, water banks and agriculture lands. There are nearby barns for raising cattles and poultries. Most of the streets are dusty with garbage scattered everywhere. Residents complain of bird losses due to weasels attack.

2. Survey experiment:

Three separated plots (5000 m², 50*100 m) were selected for each tested area at each habitat, approximately 25000 m². A hundred traps, for each plot/area were baited every evening for three consecutive days monthly. The mechanical traps used (40 X 15 X 20 cm) are divided into to parts. The first part represent one – third of the trap for live baits (Figure,1) and the rest were baited with liver as attractive bait. Fifty traps (five traps at each house) were distributed in ten houses on the roofs and skylights. Another fifty traps were

distributed in the streets near by crash and garbage collection box. Every morning traps were examined and cached weasels weighted, sexed and identified according to sex using the key of weasels by Osborn and Helmy (1980). Weasel index was recorded monthly and population densities were calculated for different seasons.

Results and Discussion

During 2017–2018 in all tested area, the trapped weasels were Egyptian weasel *M. subpalmatia* according to Wozencraft (2005). Until recently, the Egyptian weasel considered a subspecies and named *Mustela nivalis subpalmata* (Osborn and Helmy, 1980). It has been treated as its own species *Mustela subpalmatia* in the literature and was given species status. The weasel index and distribution in rural and popular human habitats of Sohag and Alexandria Governorates recorded monthly at houses and streets in Tables (1 and 2).

1. Distribution of weasel numbers in the streets and houses of the tested human habitats of Sohag Governorate:

Data in Table (1) showed that, the average weasel numbers were (115.5 and 128.4) and (97.5 and 105.3) animal in Sohag rural and popular areas for 2017 and 2018, respectively. In the first year, the weasel index at rural area was highest in June and August (10 animals) in the streets and 8.6 animals in June, in houses. This index recorded the lowest numbers in street (1-6 animals) and 1 animal in houses during June and December. In the second year, the indexes were higher in June (10.3 and 8.6 animals) and the lower in December (1 and 1.6 animals) at the street and the houses, respectively. During the same two years weasel index was high in popular area (8 and 6 animals) in June at the first year and in the second year were 9 animals in June and 6 animals in July at houses. The lowest number of weasels

were 1 and 1.3 animals in December in the first year, while reached to 1 animal in June and 1.6 animal in November – December and June in the second year at street and houses, respectively.

2. Distribution of weasel numbers in the streets and houses of the tested human habitats in Alexandria Governorate:

Data in Table (2) exhibit that, at Alexandria Governorate in rural streets and houses, weasel indexes ranged between (1.6–11 animals) and (2–10 animals) in the first year, respectively. Weasel indexes ranged between (1 – 11.6 animals) in December and July. At streets and between (2.3 animals in October to 9 animals in July, at houses during the second year. Another popular area, during the first year, weasels indexes ranged between zero animal in December and 12 animals in June and July at streets, while recorded 1.6 animals in December and 6.3 animals in June at houses. Weasel in second year recorded 1 animal in December and 12.3 animals in August at street and ranged between 2 animals in January and 6.3 animals in April and May in houses. The total average of weasels during the two year were (138.3 and 117.6) and (134.7 and 121.9 animals) in rural and popular areas, respectively.

3. Average seasonal number of weasel in houses and streets:

The average numbers of weasels' indexes during the four seasons summarized in Table (3). Data cleared that in popular habitats of Alexandria streets, weasels' were 30.45 in summer with sex ratio of 37.2%, and 17.45 in houses with sex ratio of 46%, during Spring. In Sohag Governorate, the average number of weasels were 14.6 with 50.1 % sex ratio and 20.8 with sex ratio 46.2%, during Spring at houses and street, respectively. The peak of weasels number in rural area were 23.1 with sex ratio 38.1% in spring and 29.75 with sex ratio 40.2% in summer at Alexandria

houses and street, respectively. They also recorded 19.4 and 25.95 with sex ratio 46.4% and 50% for the same season at Sohag houses and street, respectively. The average number decreased in poplar area and reached 15.95, 9.3 and 8.9 in Alexandria house compare with 13.95, 8.75 and 6.2 in Sohag houses during summer, winter and autumn, respectively. The weasels in poplar streets were 25.15, 6.15 and 6.4 in Alexandria during spring, autumn and winter, respectively compare with 18.2, 8.8 and 8.45 in Sohag during summer, winter and autumn, respectively. McDonald and Hoffman (2008) reported that, the range of *M. subpalmata* is restricted to the lower Nile valley from Alexandria to the west Port Said in the east and from the delta south to Beni-Suef. Basuony *et al.* (2010) reported that weasels were trapped from the city of Aswan (650 K.M. south of Beni-suef). In all studied areas, the results in Figure (1) showed that the highest number of weasels recorded in summer where the mating season and the increasing rate of weasels in Sohag were less than Alexandria Governorate due to the thermal stress on animals as results of high temperature, which affects the fertility and production. The temperature degree in Sohag is higher than Alexandria by 10 °c during different months. The weasels record highest number in houses where the mating season begins and the construction of nests in safe place. Brown and Lasiewski (1972) found that metabolism of weasels to be inversely related to ambient temperature. Zub *et al.* (2013) reported that high ambient temperatures (T_a) was related in a “hump-shaped” (i.e. convex) manner to activity time (AT), daily energy expenditure (DEE), resting metabolic rate (RMR) and metabolic scope (the ratio of DEE to RMR). This results supported the HDL hypothesis because in response to warm ambient

high temperatures T_{as} male weasels reduced their AT, DEE and RMR.

Although the activity and energy expenditure of large endotherms are most likely to be constrained in response to warm T_{as} because they are less able to dissipate heat. Our results suggested that small endotherms might also experience constraints consistent with the HDL hypothesis. In the houses and streets of Alexandria the number of weasels decreased significantly with the month of September to December and this decline may be due to strong winds and rainfall that hinder the weasel number (Figure,2). The rate of decline in the street was higher than the houses then gradually adapted numbers with the improvement of the atmosphere and beginning of biological activity in March to August. Eisa (2001) reported that the highest number of weasels recorded during July in Cairo and June in Giza but the lowest number in January of both governorates

In Sohag Governorate, the number of weasels started in the gradual titration early from February to August. Weasel numbers in Alexandria were highest compared with Sohag due to the thermal stress to animals in Sohag. Regarding of the achieved results, it was clear that the number of weasels in the streets was greater than in the houses in the two Governorates, by means of reproduction and the search for prey. As well, the weasel numbers in the rural areas were more than in the poplar area as a result of the availability of food, rodent, small birds and domestic birds. Moreover, abundance of females in houses were highly compared with street and the male percent more than 60% compare with females in all areas.

It is concluded that the disturbance weasels induces during high temperature months and could development suitable control program to get rid of weasels according to their abundance and distribution in houses and streets of rural and popular human habitats.

Table (1): Average weasel index at Sohag Governorate during 2017 and 2018 in the two tested human habitats.

Months	Poplar habitat				Rural habitat			
	First year		Second year		First year		Second year	
	House	Street	House	Street	House	Street	House	street
Janauary	1.6	1.6	1.6	1	3.3	1.6	3	2.3
Febraury	3	3	4	4	3.3	2.6	2.6	4
March	4	4	3.3	4	4	4	5	3
April	4	5	4	6.3	4.6	4	4	5
May	4	6	5.6	7.3	6	1.3	7	7.3
June	6	8	5.6	9	8.6	10	8.6	10.3
July	5	6.3	6	6.6	8	9.3	7.6	10
August	4.6	5.6	5	7	5.3	10	6	9
Septembe	4	5.3	3.3	5.6	6	6	6.3	7.6
October	3.3	5	3	4.3	5	4	5.6	6.3
November	1.6	4.3	1.6	3	2.3	3.3	3.3	2
December	1.3	1	1.6	2.6	1	2	1.6	1
Total	42.4	55.1	44.6	60.7	57.4	58.1	60.6	67.8
	97.5		105.3		115.5		128.4	

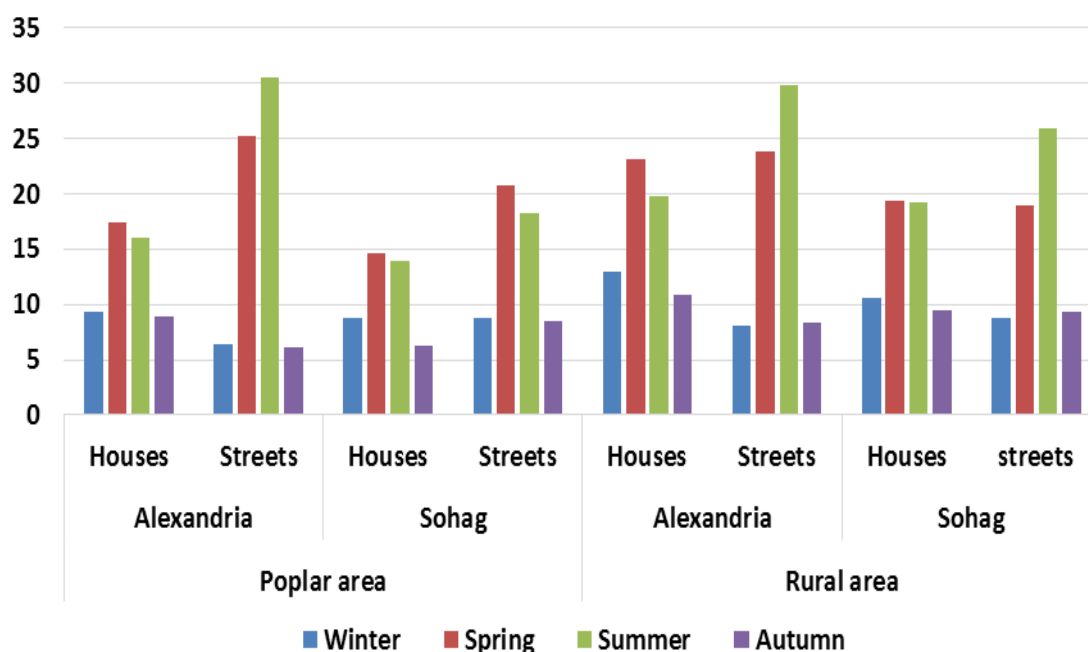


Figure (1) :Survey weasel during during the 4 seasons of the year in tested human habitats/ areas

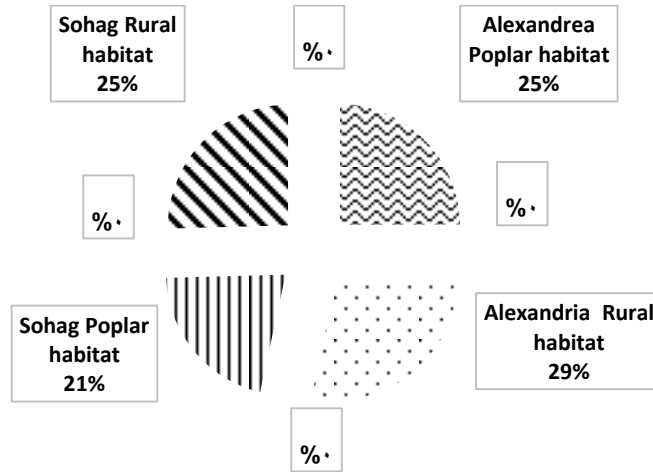


Figure (2): Weasel numbers in different area of Alexandria and Sohag Governorates

Table (2): Average weasel index at Alexandria Governorate during 2017 and 2018 in the two tested human habitats.

	Months				Popular habitat			
	First year		Second year		First year		Second year	
	Houses	Streets	Houses	Streets	Houses	Streets	Houses	Streets
January	3	1.6	2	1.3	4	2.3	3	1.3
February	3.3	1.3	2.3	1.6	4.3	4	3.6	1.3
March	4	4	4	3	5.6	4	5.3	3.3
April	5	4	6.3	5.3	6.3	6.3	6	5
May	5	8	6.3	9	9	10	8	6.6
June	6.3	12	6	12	8.6	9.3	8.3	10.3
July	5.6	12	6	12	10	11	9	11.6
August	6	11.6	6	12.3	7	8	8.6	11.3
September	4	7	4.3	6	2	8	3	9.6
October	3	4	4.6	3.3	2	5	2.3	4
November	3.3	2	3	2	4	2	4	3
December	1.6	0	2.3	1	4	1.6	5.3	1
Total	50.1	67.5	53.1	68.8	66.8	71.5	66.4	68.3
	117.6		121.9		138.3		134.7	

Table (3): Average seasonal numbers and sex ratio of weasels during 2017 and 2018 in tested human habitat .

Months	Poplar habitat								Rural habitat							
	Alexandria				Sohag				Alexandria				Sohag			
	Houses	Sex ratio	Streets	Sex ratio	Houses	Sex ratio	Streets	Sex ratio	Houses	Sex ratio	Streets	Sex ratio	Houses	Sex ratio	Streets	Sex ratio
Winter	9.3	42.1	6.4	40.5	8.75	45.7	8.8	42	12.9	38.4	8.1	36.2	10.6	41.2	8.75	42.3
Spring	17.45	46	25.15	39	14.6	50.1	20.8	46.2	23.1	38.1	23.75	37	19.4	88.2	18.95	36.4
Summer	15.95	50	30.45	37.2	13.95	50	18.2	50	19.8	46.4	29.75	40.2	19.2	51	25.95	50
Autumn	8.9	38.2	6.15	40.3	6.2	40.1	8.45	44.1	10.8	41	8.3	38.8	9.4	46	9.3	42.4
Total	51.6		68.15		43.5		57.9		66.6		69.9		59		62.95	
	59.875				50.7				68.25				60.975			

References

- Basuony, M.; Gilbert, F. I. and Zalat, S. (2010):** Mammals of Egypt. Atlas, red data listing and conservation. Alexandria library and culnet publishers, Cairo. Egypt.
- Brandt, M. J. and Lambin, X. (2005):** Summertime activity patterns of common weasels *Mustela nivalis vulgaris* under differing prey abundances in grassland habitats. *Acta Theriologica*, 50: 67–79.
- Brown, J.A. and Lasiewski, R.C. (1972) :** Metabolism of Weasels: The Cost of Being Long and Thin. *Ecological Society of America*, 53 (5): 939-943.
- Eisa, Y.A. (2001):** Ecological and biological studies on weasel in Egypt with special references to their population. Thesis M.Sc. Faculty of Agriculture-Al-Azhar University.
- Hosoda, T.; Suzuki, H.; Yamada, T. and Tsuchya, K. (1993):** Restriction site polymorphism in the ribosomal DNA of eight species of Canidae and Mustelidae. *Cytologia (Tokyo)*, 58 (2): 223-230.
- McDonald, R. H. and Hoffmann, M. (2008):** *Mustela subpalmata* (on – in). The Iucnredlist of threatened species. Accessed at <http://www.incnredlist.org/details/4/660/0>.
- McDonald, R. and Hoffmann, M. (2016):** "*Mustela subpalmata*". The IUCN Red List of Threatened Species. IUCN. 201doi:10.2305/IUCN.UK.2016-1.
- Osborn, D. J. and Helmy, I. (1980):** The contemporary land mammals of Egypt (including Sinai). *Field Zool New Ser.*, 5: 1 – 579.
- Rodrigues, M.; Bos, A.R.; Hoath, R.; Schembri, P.J.; Lymberakis, P.; Cento, M.; Ghawar, W.; Ozkurt, S.O.; Santos-Reis, M.; Merilä, J. and Fernandes, C. (2016):** Taxonomic status and origin of the Egyptian weasel (*Mustela subpalmata*) inferred from mitochondrial DNA. *Genetica*, 144(2):191-202. doi: 10.1007/s10709-016-9889-y.
- Samson, C. and Raymond, M. (1995):** Daily activates pattern and time budget of stoats (*Mustela ermine*) during summer in southern Quebec. *Mammalia*, 59: 501-510.
- Sundell, J.; Norrdahl, K.; Korpimäki, E. and Hanski, I. (2000):** Functional response of the least weasel, *Mustela nivalis nivalis*. *Oikos*, 90(3), 501–508. doi:10.1034/j.1600-0706.2000.900308.x
- Wozencraft, W. (2005):** Order carnivora pp. 532 – 628 in D Wilson, D Reedr, eds. *Mammal species of the world: A taxonomic and geographic reference*, vol, 3. Washington Dc, USA: Smithsonian institution press.
- Zalewski A. (2000):** Factors affecting the duration of activity by pine martens (*Martes martes*) in the BiaowiezÇa National Park, Poland. *J. Zool. Lond.*, 251: 439-447.
- Zub, K.; Fletcher, Q.E.; Szafrńska, P.A. and Konarzewski, M. (2013):** Male weasels decrease activity and energy expenditure in response to high ambient temperatures. *PLoS ONE* 8(8): e72646. <https://doi.org/10.1371/journal.pone.0072646>