
VARIABILITY IN RANGING BEHAVIOUR OF ELEPHANTS IN NORTHERN KENYA

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ABSTRACT

The elephants of Laikipia and Samburu Districts in northern Kenya range over a huge variety of habitats and land uses, and there is great variability in home ranges within the population. The movements of these elephants were studied intensively in 1990 to 1992 and monitoring has continued for an additional five years. Elephants now resident in the well-protected private ranches of Laikipia District are believed to have moved south from Samburu District during the course of the 1970s and 1980s in response to intensive poaching. It was anticipated that, as a result of decreased elephant poaching during the 1990s elephants might spend more time in the northern part of their range, thus reducing the impact on vegetation and farms in the south. The monitoring programme has shown no consistent northwards shift in elephant ranges during 1993 to 1997, although the ranges of some individual matrilineal groups have changed substantially during this time, possibly as a result of increasing levels of human disturbance. There is also much more overlap between different sub-populations and variability within sub-populations than previously suspected.

RESUME

Les éléphants des Districts de Laikipia et de Samburu au nord du Kenya abritent une zone à grande variété d'habitats et de formes d'utilisation des terres. Il y a une importante variabilité sur le terrain à l'intérieur de cette population d'éléphants dont les mouvements ont été étudiés de manière intensive entre 1990 et 1992 avec un suivi pendant les cinq années ayant succédé l'étude. On pense que les éléphants qui résident maintenant dans un ranch privé bien protégé au niveau du District de Laikipia seraient venus du District de Samburu entre 1970 et 1980, à la suite d'un braconnage intense. Suite à la diminution du braconnage des éléphants pendant les années 1990, on espérait voir ces éléphants passer plus de temps dans la partie nord de leur zone de distribution avec pour conséquence la diminution de leur impact sur la végétation et les champs dans la partie sud. Le programme de suivi n'a pas relevé un changement significatif au niveau de la distribution des éléphants dans la partie nord de 1993 à 1997, malgré les changements substantiels observés au niveau des répartitions de quelques individus matrilinéaires pendant cette période, probablement à cause de la croissance des perturbations occasionnées par l'homme. Il y a également beaucoup plus de chevauchement entre les différentes sous-populations et plus de variabilité à l'intérieur des sous-populations que préalablement suspecté.

INTRODUCTION

There are about 3,000 elephants living in Laikipia and Samburu Districts in Kenya. The elephants move between private ranches in Laikipia and arid communal areas and montane forests in Samburu. As a result of their use of these differing areas, they present a variety of conservation problems. They come into conflict with small-scale farmers on the southern edge of their range (Thouless, 1994), have an impact on vegetation and fences in the ranches (Thouless and Sakwa, 1995) and are under pressure from heavily armed poachers in the north.

The movements of the Laikipia-Samburu elephants have been studied since 1990. An intensive study was carried out between May 1990 and December 1992, in which up to 20 radio-tagged elephants were located every 10-15 days. This study showed that there was enormous variation in home range size within the population, with minimum convex polygon home range sizes varying from less than 150km² to over 5,000km² (Thouless, 1996). The population included several overlapping sub-populations, showing distinct patterns of movements, and tending to avoid each other while in the same area (Figure 1) (Thouless, 1996). Elephants from the 'migrant' sub-population moved 80-120km in a north-easterly direction

during the two rainy seasons, between ranches in Laikipia and arid low-lying communal grazing areas in Samburu district (Thouless, 1995). The 'resident' sub-population included animals with small home ranges based exclusively on the Laikipia ranches, while elephants from the 'Ewaso' sub-population had home ranges of intermediate sizes based on the ranches, but with some seasonal movements. The 'Mathews' sub-population had medium sized home ranges on the eastern side of the Mathews Range in Samburu, and never came south to Laikipia. Another apparently distinct sub-population consisted of elephants with a dry season range around Lewa Downs ranch and the Ngare Ndare Forest Reserve in the eastern part of Laikipia. These elephants dispersed northwards into communal grazing lands during the wet season, but over a much shorter distance than did members of the 'migrant' sub-population.

Fifty years ago there were almost no elephants in L

aikipia but large populations to the north in Samburu. so the substantial changes must have taken place within the lifespan of some elephants which are still alive. The new patterns of movement are probably a response to the increased bush cover and water availability in Laikipia, together with greater poaching pressure and conflict over water in Samburu.

Figure 1. Sub-populations of elephants from Laikipia and Samburu Districts, Kenya as described in Thouless (1996). Each grey polygon shows the outline of minimum polygon home ranges from a typical animal from each sub-population (name shown in uppercase *italics*). Protected areas shown with thick outlines. Scale along axes in kilometres.

Poaching has been greatly reduced since the formation of the Kenya Wildlife Service in 1990. It has been suggested that as a result of reduced poaching and

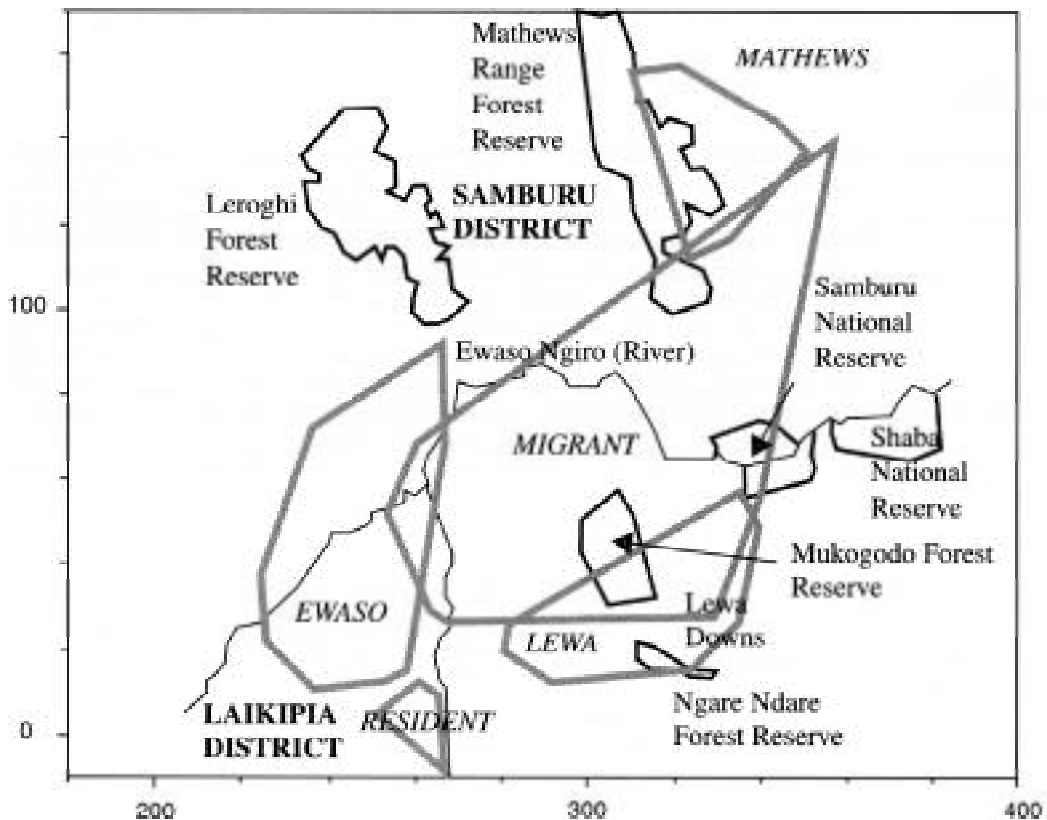


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greater human tolerance, the elephants may return to their original range in the north. This would lead to a reduction of the ecological impact on the ranches and conflict in small-scale farming areas. The main reason for continuing the elephant movement study has been to find out whether movement patterns have changed as predicted, and to what extent conclusions about elephant movements based on a relatively short-term study are valid over a longer time period. If animals were returning to the north, one might expect that elephants from the 'migrant sub-population' would either shift their ranges further north, spend more time in Samburu, or even adopt home ranges similar to those of the 'Mathews' sub-population. Similarly one would expect elephants from the 'Ewaso' and 'Lewa' sub-populations to extend their ranges to the north, perhaps adopting movement patterns similar to those of the 'migrant' sub-population.

METHODS

Elephants were fitted with Telonics Inc. MOD-605 radio transmitters attached to machine belting neck collars as described in Thouless and Dyer (1992) and Thouless (1995). During the intensive phase of the study, collared elephants were located from the air at intervals of approximately seven to ten days. No tracking was carried out between January and August 1993. Thereafter elephants were located at intervals of one to two months. Some radio collars have been replaced on the same individuals or other members of the same families, and new elephants have been collared in areas where additional information is needed.

RESULTS

Continuity of monitoring

At the end of the intensive phase of the project, in December 1992, 18 collars were still operational out of the original 20. One collar had been removed, and one collared elephant killed as a 'problem animal'. It was decided to continue monitoring elephants only from the migrant', 'Lewa' and 'Ewaso' sub-populations (Figure 1), so transmitters on six elephants from the 'resident' and 'Mathews' sub-populations were allowed to run down without replacement. Transmitters on four other elephants failed, or the collars broke, before it was possible to replace them. Monitoring has continued for the remaining eight families for six to seven years. Collars have been replaced on the same elephants, or new collars placed on other members of the same matriline.

Between 1993 and early 1997 an additional six elephants

were collared. Three of these collars are still operational.

Longevity of collars

Two collars were known to have fallen off, after two-and-a-half and two years respectively. Ten elephants were followed until the signals from their transmitters became weak as the batteries ran down. They all lasted for more than four years, with the majority continuing for about four-and-a-half years. One lasted for five-and-three quarter years.

Changes in range

Table 1 shows the 100% minimum convex polygon home range sizes calculated in 1992 and in 1997 for the eight families that have been tracked for six or more years. There was little change in the movement patterns of the elephants from the 'migratory population'. They continued to move between the Laikipia ranches in the dry season, and the communal grazing areas to the north and east during the rainy seasons. However, one of these families (66/17) was observed further north than before, in an area that was subjected to heavy poaching pressure in the 1980s, during the unusually wet rainy seasons of 1994/5 and 1997/8. 82/17 showed a very slight expansion in range to the north, while 52/25, the other 'migratory' elephant still collared, showed no evidence of a shift in ranging behaviour.

Elephants that were permanently resident on ranches close to the confluence of the Narok and Ngiro rivers (74/19 and 86/23) have shown no sign of a northwards shift in range. In both cases, a slight recorded increase in home ranges since 1992 has resulted from use of areas slightly to the south-east of the previous ranges.

One of the two 'Lewa' elephants - 42/46 - ranged over a much wider area in the wet seasons of 1993 to 1997 than previously. On two occasions she was even found in the Somali grazing area to the south of Shaba National Reserve, which is considered to be relatively unsafe for elephants. However, there was no northwards expansion in her range and she did not cross to the north of the Ewaso Ngiro river. The other Lewa elephant - 50/38 - had a much smaller range, which was slightly expanded to the east in the 1993 to 1997 period.

Matriline 54b/c was considered, on the basis of its movements in 1992, to be part of the 'ranch resident' subpopulation, based on O1 Pejeta ranch and the area to the immediate north. However, its range shifted substantially. During 1993-4 the members of this matriline ranged widely between their former range and Lewa Downs rancho to the east, but from 1995 onwards, they were back in their original relatively small home range to the east of the Ewaso Ngiro river.

Table 1: Changes in home range size measured as minimum convex polygons (MCP) between 1992 and 1997.

Ele ID	Sub-population	MCP (1990-1992)/ km ²	N (1990-1992) km ²	MCP (1990-1997)/ km ²	N (1990-7)	% increase in range
66/17	Migrant	5,206	84	6,079	108	16
52125	Migrant	3,656	86	3,707	118	1
82/13	Migrant	2,650	51	3,108	70	17
74/19	Ewaso	2,294	50	2,602	69	13
86/23	Ewaso	1,567	49	1,663	67	6
42/46 b	Lewa	1,439	74	2,610	106	81
50/38	Lewa	624	79	899	88	44
54 b/c	Resident	500	32	2,856	65	471

Changes in home ranges have been seen for elephants tracked over a shorter time period. Figure 2 shows observations for three elephants from the 'Lewa' subpopulation. For the first few months after she was collared in January 1991, 54a showed movement patterns similar to other 'Lewa' elephants, moving north from Lewa into the rangelands south of the Samburu National Reserve in the wet season. However, in May 1991, she moved 60km west, and remained in that area until she was shot dead by KWS rangers during a problem animal control operation in December 1991.

Elephant 96 was collared in the insecure Somali grazing lands to the north east of Isiolo town in January 1993. For two years, she remained in this area, but in June 1995, she appeared on Lewa Downs ranch, and thereafter adopted movement patterns similar to elephants from the 'Lewa' sub-population.

Number 21 was a young bull collared with a family group on Lewa Downs in January 1996. In June 1996 he was found in the Imenti forest, which is less than 30km from Lewa, but separated from it by a main road and intensive agriculture. The Imenti forest is a small patch of indigenous forest close to Merit town, and connected to the main Mt Kenya forests by a narrow forest corridor. Small farms surround it, and crop-raiding by elephants from the Imenti forest is a major problem. It had previously been supposed that these elephants originated from the Mt Kenya forests, but this result indicates that some at least come from lowland elephant populations.

Overlap between sub-populations

Collaring of additional elephants has shown that the divisions between sub-populations are not quite as simple as appeared after two years of study. The ranges of 'Lewa' and 'Ewaso' elephants show considerable overlap, although they use very distinct dry season ranges, and there is also a greater variety of movement patterns than initial results indicated. The first three collared members of the Ewaso sub-population - which spends the dry season on Laikipia ranches to the south of the dry season range of 'migrant elephants-moved north in the wet season, largely remaining within the large scale ranches. However, additional elephants collared since 1992 have moved east during the wet season, with wet season ranges overlapping with those of the 'Lewa' elephants (Figure 3).

Movements of recently collared elephants of the 'Lewa' sub-population are even more complex. While they all spend at least part of the dry season on Lewa or the neighbouring Ngare Ndare forest, wet season movements occur in all directions, and there is a great deal of overlap with members of the 'Ewaso' sub-population (Figure 4). This situation is further complicated by changes in home ranges of several of the elephants collared in the Lewa area.

DISCUSSION

Between 1990 and 1997 none of the collared elephants from the Laikipia-Samburu population shifted their range substantially to the north. It had been suggested that they might start to return to their original range in response to

the greatly reduced level of poaching for ivory in the 1990s compared to the 1970s and 1980s. While there have been significant alterations in the range of individual matriline in the Laikipia-Samburu population, these have not been in a consistently northwards direction. None of the groups which remained south of the Ewaso Ngiro river in 1990 to 1992 moved north of the river in later years. While at least one of the elephants already moving across the river ventured further north after 1992, this appeared to be in response to greater availability of ephemeral water supplies during two high rainfall years.

There is actually stronger evidence for a continued southwards expansion of elephant range in the eastern part of their range. The number of elephants using the area around Lewa Downs, which includes the Ngare Ndare forest and Borana ranch, has increased. Prior to 1991 they were almost never seen on Borana, while in the following years the area was heavily used by elephants. During this time elephant 96 has shifted her range from east of Isiolo to the Lewa area. Somali pastoralists now heavily use the region in which she was first collared, and it is possible that she left as a result of increasing conflict.

It is also likely that one of the reasons why elephants are not returning to the north is because increasing human populations in these pastoralist areas have led to increased conflict over the limited number of permanent water sources, except immediately after the rains, when there is abundant ephemeral water.

The demonstration of linkages between elephant populations from Laikipia and Samburu has been an important impetus towards new conservation initiatives. Two of the most successful community conservation projects in northern Kenya, the II Ngwesi Group Ranch and the Namunyak Wildlife Conservation Trust, were established in the wet season range of the Laikipia-Samburu elephant population. These projects were initiated with support from land-owners from the ranching areas, who saw improvement in the situation to the north as a possible way forward to reducing their own elephant problems. It is now clear, however, that success depends not only on eliminating poaching, but finding ways to reduce conflict over access to water between elephants and pastoralists. Even if this is achieved, elephants may not become resident once again in the north, since access to abundant permanent water in the Laikipia

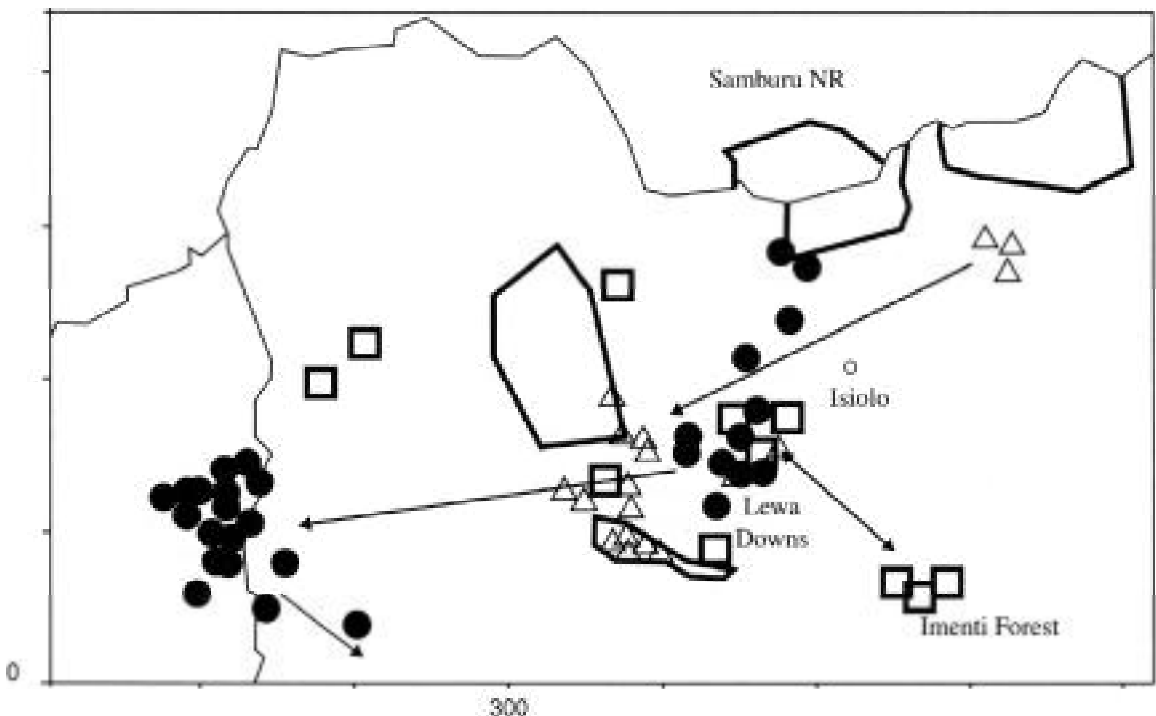


Figure 2. Observations of collared elephants from the 'Lewa' sub-population. 96- triangles; - 21 squares; 54- circles. Arrows indicate shifts in range.

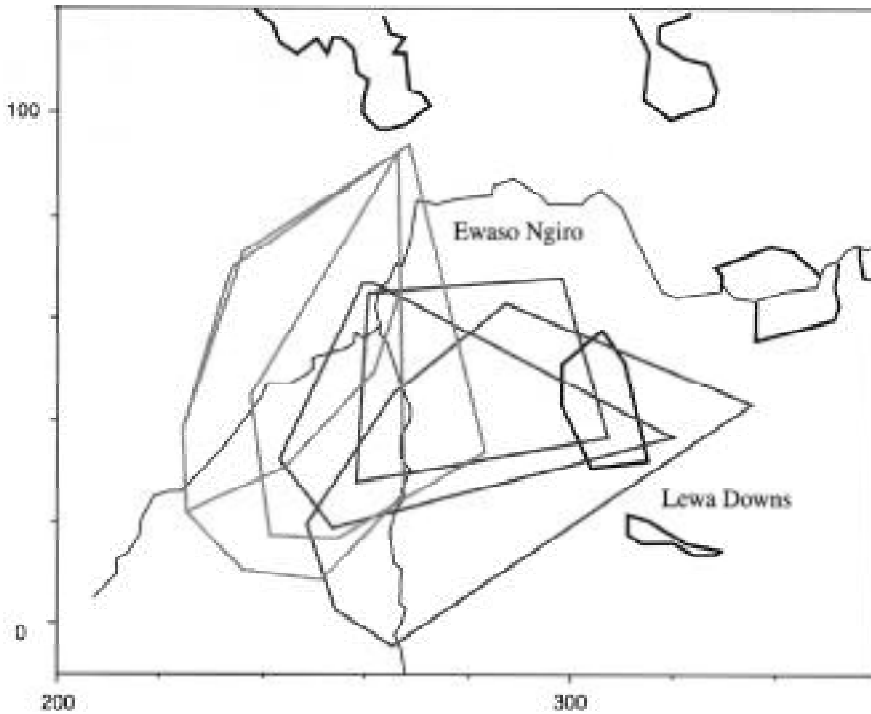


Figure 3. Minimum convex polygon home-range of 'Ewaso' elephants. Elephants remaining on ranches in the wet season shown in dark grey, elephants using pastoralist areas shown in pale grey.

ranches may still outweigh any advantages (probably involving food availability) of the northern areas.

A secondary conservation benefit of the monitoring programme has been its linkage with the Kenya Wildlife Service's anti-poaching operations. The fact that elephants have radio collars and are monitored regularly from the air is well known locally, and this has almost certainly had a deterrent effect on poachers. KWS security staff are informed when elephants move into areas where they are particularly vulnerable to poaching. Unseasonal elephant movements can be an indication that hitherto undetected poaching has occurred and lead to investigations.

While the southern part of the Laikipia-Samburu elephant range is well protected within the Laikipia ranches, and the northern part is becoming increasingly secure as a result of community wildlife programmes such as the Namunyak Trust, the intermediate area, which is used by elephants as a movement corridor, and as a feeding area towards the end of the wet season, is much less secure and less well-known. In order to get more detailed information on movement routes, it is planned to extend the monitoring programme by

fitting GPS collars on elephants from the monitored family groups. These collars automatically give elephant locations at frequent intervals, and the data can later be downloaded through a remote modem link. With this information, it will be possible to pinpoint the most important intermediate areas, and to focus community conservation and conflict resolution efforts there.

ACKNOWLEDGEMENTS

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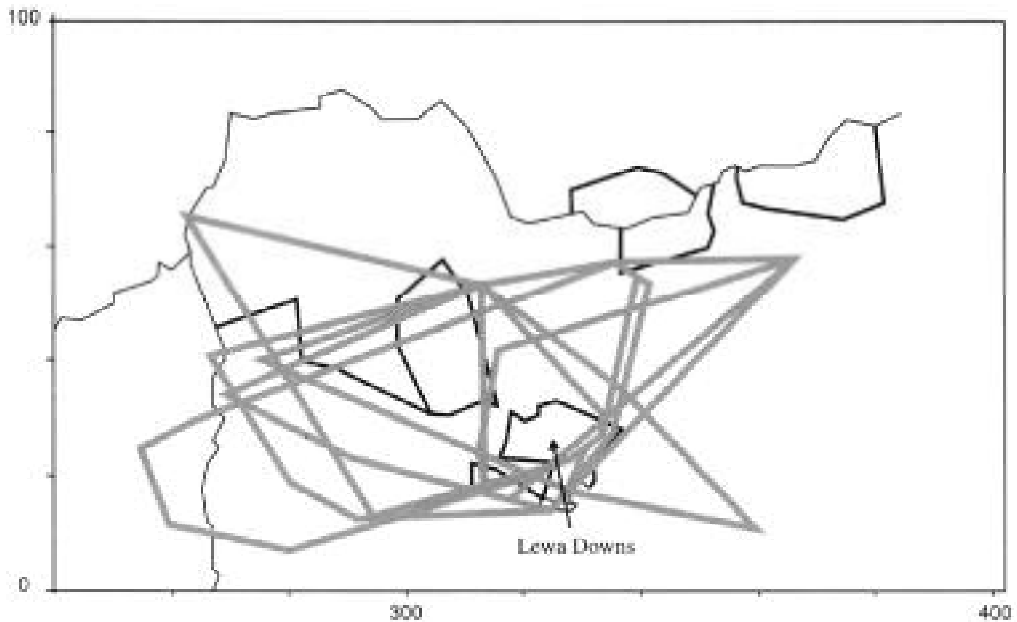


Figure 4. Minimum convex polygon home ranges of 'Lewa' elephants, showing common dry season range in vicinity of Lewa Downs ranch, but wet season dispersal to the west, north, and east.

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