Spatial ecology and reproductive biology of an invasive American mink (*Neovison vison*) population - new findings from the Czech-Moravian Highlands

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Abstract: The aim of this study was to obtain new information about the biology (spatial behaviour, circadian activity, reproductive ecology, etc.) of the American mink (*Neovison vison*) in the Czech-Moravian Highlands. A telemetry study was carried out with four males and three females in the Sazava River basin near Havlickuv Brod from 2004 to 2012. Several animals were monitored for more than a year, including the periods of mating, pregnancy and care of cubs. The telemetry study was supplemented with camera trapping and snow surveys during the winter. The research focused on sexual differences in the size and overlaps of home ranges, annual changes in spatial behaviour, circadian activity and reproductive and parental behaviour. Males and females differed in home range size, with the male home ranges being verifiably larger. The two sexes were also more active at different times: males were most active during the night, while the females were active during both day and night. The most striking sexual differences in spatial behaviour were found during the mating season (in March and April). During this period, the males occupied considerably larger home ranges than during the rest of the year. Female home ranges were stable for the whole year round. During April and May they intensively prepared burrows for parturition by bringing in organic material.

Keywords: American mink, *Neovison vison*, telemetry, circadian activity, spatial behaviour.

Introduction

The American mink (*Neovison vison*) is a medium-sized, semi-aquatic, mustelid species. In the 1920s it was introduced in Europe for fur farming (Bartoszewicz & Zalewski 2003). Some individuals escaped or were released and, over recent decades, the species has successfully established itself and spread over most of the continent. As an invasive species it has a significant impact on native European fauna, including the rare European mink (*Mustela lutreola*) (Maran et al. 1998, Sidorovich & Macdonald 2001). In the Czech Republic, the first American minks appeared in the wild at the beginning of the 1960s (Mazák 1964), but the main expansion did not start until the beginning of the 1990s. This has had a marked negative impact on the breeding success of water birds (Padyšáková et al. 2009). Minks also threaten populations of stone crayfish (*Austropotamobius torrentium*) and dice snake (*Natrix tessellata*) (Fischer et al. 2004). Analyses of the diet of American mink indicate it also predates certain species of bivalves, amphibians and mammals - mainly brown rat (*Rattus nor-*

Figure 1. The location of the study area within the Czech Republic.

vegicus), water vole (*Arvicola terrestris*) and muskrat (*Ondatra zibethicus*) (Poledník & Poledníková 2010). To date there has been no study of its influence on native mustelid species, particularly Western polecat (*Mustela putorius*), stoat (*Mustela erminea*) and weasel (*Mustela nivalis*).

American mink's typical colour is dark brown-black with a white spot on the bottom lip and chin. The size and shape of this spot is very variable and, it is possible to recognise individuals from it (Dunstone 1993). Minks show sexual dimorphism in body size. The males are significantly larger than the females (Gerell 1970).

The distribution of the species is strictly connected to presence of water. Telemetry studies show, that minks generally have linear home ranges, situated along river banks or ponds (Gerell 1970). As such the population density is usually measured as the number of individuals per kilometre of watercourse. In Europe the density varies considerably, and probably depends on the characteristics of the environment.

The aim of this study was to contribute to the knowledge of the biology of this widespread and invasive species, which may negatively affect the populations of endangered animals. We used VHF telemetry to obtain detailed information about:

a. the spatial requirements of American mink in the Czech-Moravian Highlands;
b. the home range size and their basic characteristics;
c. mink movements within their home range and distribution of activity during the day and night in both sexes, and;
d. behavioural characteristics during reproduction and beyond.

Material and methods

Study area

The study was conducted in the Czech-Moravian Highlands around the town of Havlickuv Brod. The Sazava River and its main inflows form the hydrological axis of the area (figure 1).

The mink's occupancy of the central Sazava basin is not well documented and there are no records of when it first arrived. A large mink farm operated close to the town of Havlickuv Brod for several decades but closed down at the end of the 1980s. It is not known if the farm was responsible for the establishment of the local population or if the minks came from somewhere else. From our own data (finding tracks) it is obvious that minks were regular visitors to the Sazava River near Havlickuv Brod at the turn of the 1980s and 1990s. During the next ten years it became a common species.

Mink trapping

Trapping was carried out by using wire life traps, with dimensions of 50 x 16 x 16 cm and with one entrance (figure 2).

Low intensity trapping activities were carried out in January - February 2004 and December 2004 - January 2005. During these two periods only three traps were used and two male minks were caught. In 2006 - 2008 the telemetry monitoring was interrupted due to a lack of funds. Trapping activity was renewed on 31 October 2009 and continued, with short interruptions, until the end of March 2012. We had 15 traps at our disposal during this period. Trapping activities were

Figure 2. American mink caught in a wire trap. *Photoa: P. Hlaváčová*.

Figure 3. Variation in chin spots among trapped male minks. *Photos: V. Hlaváč*.

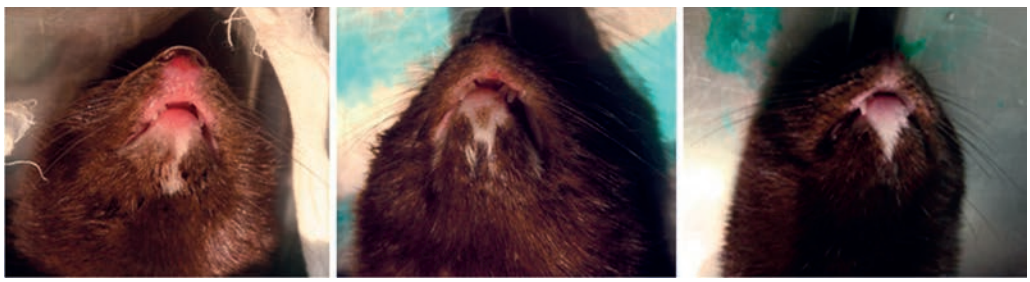

Figure 4. Variation in chin spots among trapped female minks. *Photos: P. Hlaváčová*.

regularly postponed in the summer, when there is an abundance of available food and the bait in traps is not a sufficient attraction for mink, so trapping success is very low. Low trapping success in summer and a high success rate in October (the time when juveniles disperse) and in winter (low food availability) are confirmed in other studies (see for example Yamaguchi et al. 2002).

Trapping was conducted in the following periods:

- 31 October 2009 – 26 March 2010: 766 trap nights
- 15 August 2010 – 30 May 2011: 445 trap nights
- 30 October 2011 – 5 February 2011: 328 trap nights

One trap night equals one trap set for one night. Ten trap nights equal either one trap set for ten nights or ten traps set for one night.

Table 1. Characteristics of monitored minks.

Individual	Sex	Age	Weight (g)	Frequency MHz)	Monitored period	No. of fixes*
Albert (A)	M	Adult	1600	142.0040	21/3/2004-27/5/2004	181
					27/3/2005-14/6/2005	287
Bohous (B)	M	Adult	2000	142.3510	27/1/2005-10/8/2005	936
Cecilka (C)	F	Adult	600	142.2995	08/12/2009-22/1/2011	526
			700	149.3610	29/1/2011-10/5/2011	177
			700	149.7000	09/11/2011-11/2/2012	180
Dan (D)	M	Adult	1500	142.0135	07/1/2010-21/2/2010	47
Emilka (E)	F	Adult	900	142.0031	24/3/2010-11/4/2010	25
Fany (F)	F	Adult	800	149.3420	24/1/2011-28/4/2011	129
			800	148.9820	29/3/2012-5/8/2012	84
Gustav (G)	M	Adult	1700	142.0331	30/3/2012-26/9/2012	88

* The number of independent locations where a particular mink had been tracked.

Traps were installed along water banks at places where tracks or droppings had previously been found. Sardines from a can were used as bait. The traps were checked once a day at 6:30 a.m. The minks that were not used for telemetry were weighed, photographed and released back at the same place. Individuals were recognised by different spots on the chin (Dunstone 1993) (figures 3 and 4).

Mink marking

VHF transmitters were implanted into the abdominal cavity of chosen individuals. The operation was done by Dr. Pavel Vrbka in Ledeč nad Sázavou. The weight of the transmitters did not exceed 14 g, which is less than 2% of mink´s body mass. This proportion is in line with recommendations from the specialised literature (Dunstone 1993, Kenward 2001).

The transmitters used were the M1230 from Advanced Telemetry Systems (Isanti, USA) and the TXE-207I from Telenax (Playa del Carmen, Mexico) (with frequency ranges of between 142.0000 – 149.7000 MHz). We used AOR AR8000 and AR8200 scanning receivers (AOR LTD., Tokyo, Japan), which were connected to a three element Yagi antenna, or a twiglike omnidirectional antenna, which was placed on the roof of a car during triangulations. The characteristics of the monitored animals are shown in table 1. The number of fixes refers to the number of independent locations of the mink.

Telemetry

The animals were located using classical VHF telemetry. In case of total loss of connection the animal was found by using an ultralight airplane. Records were taken of whether the mink was moving ('active') or resting ('inactive') at each location. The resting sites, which were found by day, were described. The exact locations were directly marked on a 1:10,000 map or were recorded on GPS map 76 (Garmin).

The Kernel method was chosen to express the home range. This was calculated in the Arc View GIS 3.2 programme with Animal Movement extension. Least square calculated value (LSQV) was used to provide a smoothing effect. These calculations gave the size and shape of home ranges, which include 95% of all animal locations.

The habitat of minks is restricted to watercourses and ponds, where minks use the immediate surroundings of the banks (most often within 2-3 m from the bank line). That is why the length of water banks is the main property of its home range. Along small streams the minks use both banks, while in larger streams they move along just one bank

(each bank creates a particular biotope). The banks of small streams (narrower than about 5 m) were counted only once (minks are able to visit both banks), whereas the banks of large watercourses (wider than about 5 m) were counted separately.

Daily VHF tracking also made it possible to determine the average travel distance during a single day in males and females. Furthermore, it enabled to set the ratio of day and night activities in relation to sex and the cause of death in the observed mink.

Figure 5. It is extremely difficult to get a distinguishable picture of minks' chin spots in nature. *Photo: V. Hlaváč.*

Camera traps

Two types of camera traps were used (Reconyx Rapid Fire – three units and Scout Guard – two units) in 2010-2013. Monitoring was carried out for 252 'camera trap days'. One camera trap day means one camera trap set for one day. The camera traps were usually placed in the home ranges of the radio-tracked animals, mainly under bridges of small streams flowing into the Sazava and on the river banks. Special monitoring was carried out also during a period when two females, C and F , were taking care of their cubs. The camera traps were situated next to the dens to enable daily observation of parental behaviour.

Although no detailed analysis of the diet was carried out, the combination of the telemetry and camera traps study helped to estimate the trophic niche of the American mink on the Sazava River.

Results

Mink trapping

There were 29 trappings of 19 different individuals between 2004 and 2012. In the first period (2004-2005) one mink was trapped within 66 trap nights. During this period another mink in a concrete culvert was unexpectedly caught by hand. In the period 2009-2012 15 traps were used and in the course of 1579 trap nights 17 individuals were caught. One mink was trapped five times during one winter. Males were trapped much more often than females: Overall 16 different males (in 22 cases) and three different females (in 7 cases) were caught. Seven individuals were chosen for the telemetry study in order to have information from a similar number of animals of both sexes.

Use of chin spots for the identification of individuals

The chin spots of all the captured animals were documented. The large variability of spots allowed us to distinguish individual animals (figures 3 and 4). However, it was very difficult to obtain a clear image of spots in the field. During our research we obtained only few camera trap shots or pictures taken during direct observation where the spots were clearly distinguishable (figure 5). To document the spots for a reliable assessment it was usually necessary to catch the animal.

Home range characteristics

The monitoring showed a difference between males and females in home range size and spatial behaviour. The male minks' movements and spatial behaviour were more differ-

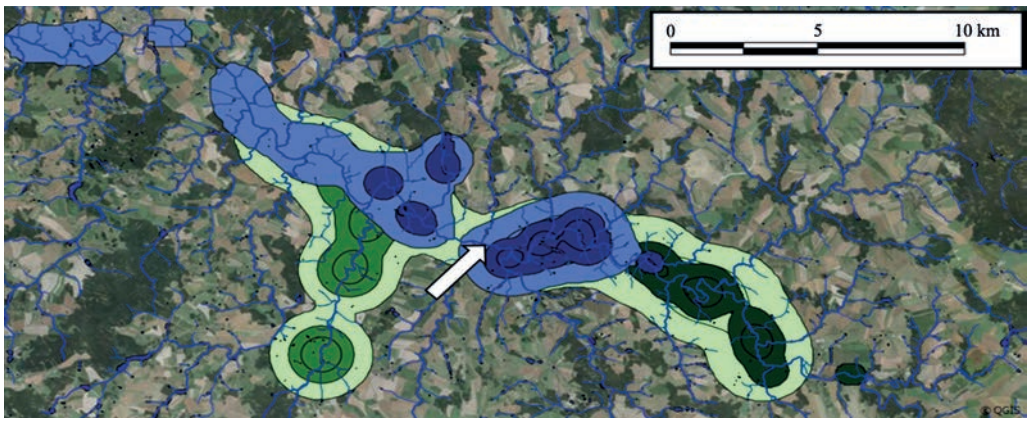

Figure 6. The home ranges of males A (green) and B (blue) during mating periods and during the rest of the year. The arrow indicates the location where both males were seen mating with the same female. Green indicates the home range of male A outside the mating season in 2004 (medium green) and 2005 (dark-green) and during the mating season (March and April) of 2005 (light-green). Blue indicates the home range of male B in 2005 during (medium blue) and outside (dark-blue) the mating season.

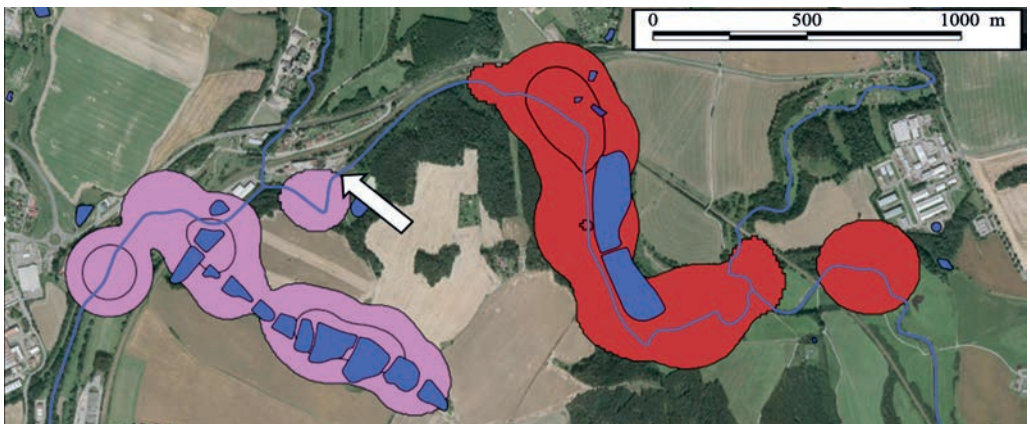

Figure 7. The home ranges of females C (red) and F (pink) in the 24 January 2011- 28 April 2011 period. The location where both females were caught is indicated by an arrow. Fish ponds and watercourses are indicated in blue.

ent during the mating season (March, April) than in the rest of the year. During the mating season males increased their home ranges and started to occupy much larger areas. They did not defend their territories at all. The males A and B used the same section of the river, having occupied large areas: male A used 137 km of banks and male B 178 km. During the mating season they met each other several times, used the same resting sites and were even seen to mate with the same female during one night. They moved quickly along the river bank until they found a female. They then stayed there for several hours or even days. The males were able to move for long distances during one night. The maximum distance of the day/night movement was 21.3 km for male B and 20.5 km for male A. The overlap of the area which they used in the mating season was approximately 70%. Tracking on the fresh snow cover allowed us to compare the movement of the radio-tracked animals with the movement of other minks in the area. It was obvious from the track findings that this

Figure 8. The home ranges of female F (purple) and male G (green) between 30 March 2012 and 26 September 2012. Fish ponds and watercourses are indicated in blue.

area was shared also with other males.

The male home ranges were stable, apart from the mating period. However, the ranges could change after the mating season. Male A, which was monitored for two years, spent the first year (2004) on the Sazava River downstream of Havlickuv Brod and on the Usobsky stream, then after the mating season (May 2005) it moved and settled 17 km upstream along the Sazava River (measured as the length of the riverbank between the centers of the home ranges) (figure 6).

The home ranges of the females C and F were situated next to each other. Even though both females were trapped during one night at the same place, no home range overlap was recorded during the period when both females were radio-tracked simultaneously (figure 7).

Male D, which was followed at the same time, occupied a much larger area, which included the home ranges of both females.

Several weeks after female C was killed by a hunting dog, female F moved into the territory that had became free. This female (F) had a litter 36 days after transmitter implantation and her release. Her four cubs were born on 5 May 2012 and stayed in the same den until 6 June 2012 (recorded by the camera trap survey). The male G was a regular visitor to the same pond where the female had her cubs (figure 8).

There were large differences in the home ranges of males and females. The males' home ranges were smaller in 2011-2012 than in 2004-2005 (we do not have information on female home ranges for this earlier period). However, this difference was not significant (Wilcoxon Rank sum test, P=0.2), so the earlier data for the males could also be used for comparison. Overall, the home ranges of males were significantly larger (t-test; P=0.01013): on average they covered 30.4 km of banks (except during the mating season), while the females' home ranges covered just 7.5 km of banks (figures 9A and 9B). The characteristics of the home ranges are described in table 2.

Circadian activity

There was a remarkable difference in the circadian activities of males and females. The males were mostly active in the evening and

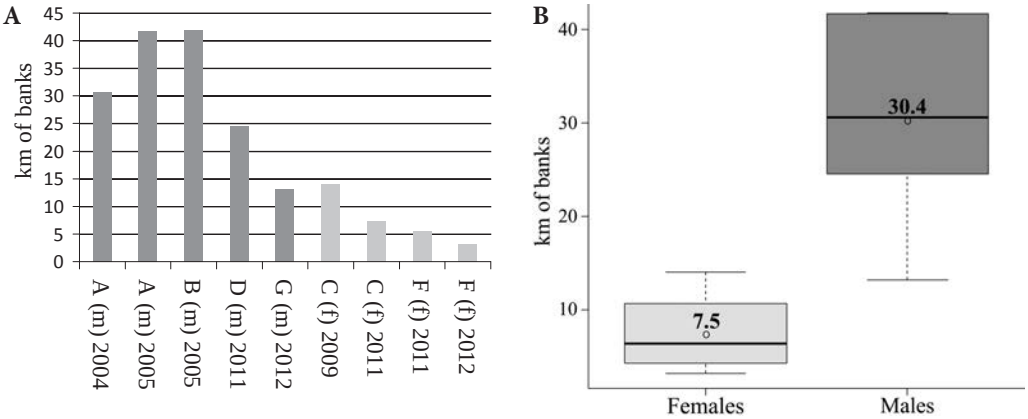

Figure 9. A. Home range size (km of banks) of individual (A, B, etc.) male (m; dark-grey) and female (f; light-grey) minks. 2004, 2005, etc. refers to the year in which the data were taken. B. Home range size (km of banks) of females and males. Mean values are marked by circles.

Table 2. The characteristics of the minks' home ranges.

Individual	Male / female	Length of waterflow in home range (km)	Length of Sazava River (km)	Length of other streams (km)	Number of water basins	Area of water basins (ha)	Length of banks of water basins (km)	Length of all banks (km)
A 2004	Male	16.163	7.135	9.028	60	7.228	7.287	30.585
A 2005	Male	19.872	13.920	5.952	32	9.252	7.902	41.694
A – including mating season	Male	80.218	35.542	44.676	91	37.212	21.743	137.503
B 2005	Male	18.260	11.145	7.115	57	24.177	12.431	41.836
B – including mating season	Male	56.799	29.819	26.980	42	148.210	93.264	179.882
C 2009	Female	5.950	4.175	1.775	12	7.800	3.965	14.090
C 2011	Female	2.930	2.719	0.211	5	5.6191	1.736	7.385
D 2010	Male	9.119	6.180	2.939	28	14.5511	9.304	24.603
F 2011	Female	1.019	1.019	0	12	67.896	3.415	5.453
F 2012	Female	0.950	0.911	0.039	2	4.852	0.851	2.750
G 2012	Male	4.215	4.121	0.094	16	73.231	4.915	13.251

night time while the females were equally active during the day and night (figures 10 and 11). Since the number of the animals involved is rather low, these findings should be verified by further research.

Movements

The longest distance travelled in 24 hours was 21.6 km (achieved by mink A). Among females the longest distances travelled were by females E and C (5.10 km and 5.04 km respectively). Female F was the least mobile: her longest movement was just 0.85 km in one day. The average daily movements in each month significantly differed between males and females (nested ANOVA, P=0.017). The greatest difference was recorded during March and April, when the males' mobility greatly increased (figure 12). A higher level of mobility, in individuals of both sexes (B and

Table 3. Causes of mortality of monitored individuals.

Individual	Cause of mortality
Male A	Was found dead in his resting site – unknown reason
Male B	Did not die during monitoring
Male D	Shot by a hunter
Male G	Killed by a car on the road
Female C	Killed by a hunting dog
Female F	Killed by a hunting dog
Female E	Died 10 days after releasing – unknown reason, maybe trouble with implantation?

C), was recorded in August, the period when young animals start occupying new home ranges.

Mortality factor

The causes of mortality in the monitored individuals are summarised in table 3. While the monitoring sample was too small to evaluate mortality factors in general, it is interesting to summarise the reasons of death of the radio-tracked animals.

Six animals died during the research period: half of them were killed by a hunter or a hunting dog. It seems that hunting may have some influence on the population density on the Sazava River. One animal was killed by a car on the road and one female died ten days after being released, probably due to troubles arising from the implantation.

Diet

The information about the minks' diet was obtained by camera trap records, direct observation and prey remains at the feeding sites. The most frequent prey included rodents - mainly water voles (*Arvicola terrestris*) (eight records) and brown rats (*Rattus norvegicus*) (five records) with, on one occasion, a muskrat (*Ondatra zibethicus*) (caught by a male mink) (figures 13 and 14). Another important prey group were fish, usually smaller individuals (five records), although one male mink caught a 7 kg silver carp *(Hypophthalmichthys molitrix).* Water birds were also recorded in the minks' diet (a female mink was pictured on a camera trap with an adult wild duck (*Anas platyrhynchos*) as her prey (figure 15). Considering the spatially limited data and the

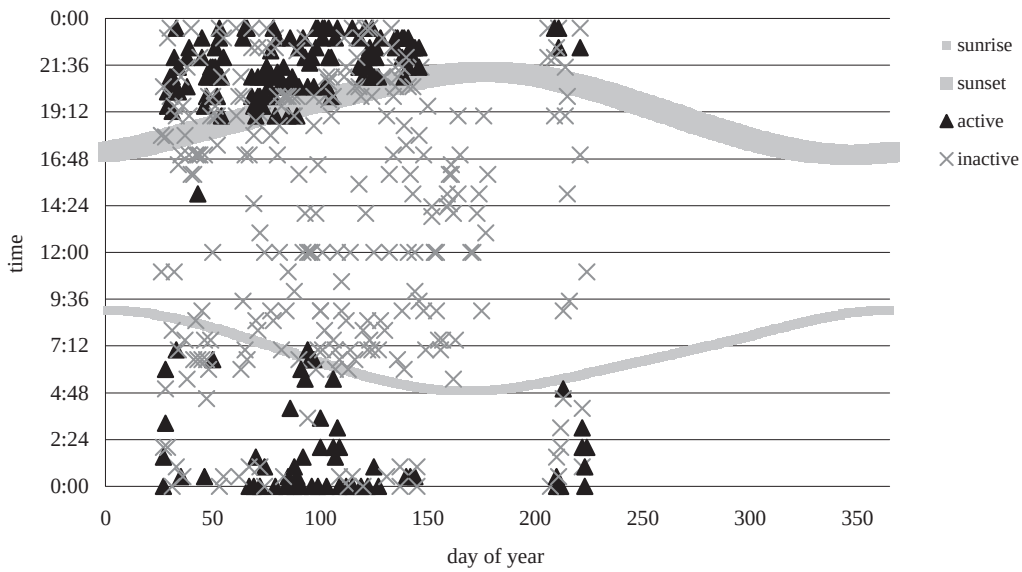

Figure 10. Distribution of active and inactive male locations during a year (1 January - 31 December), by hour of day.

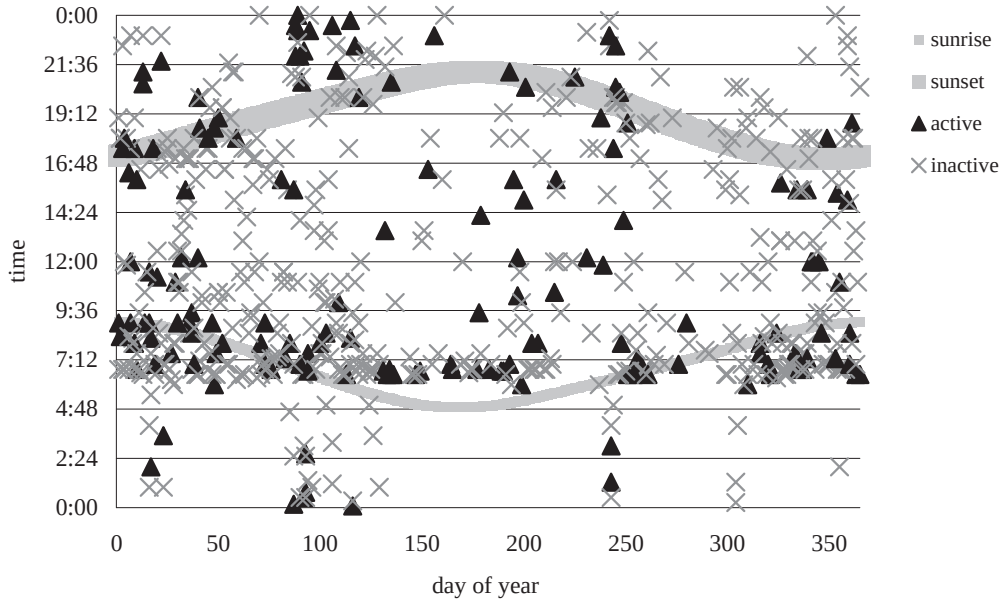

Figure 11. Distribution of active and inactive female locations during a year (1 January - 31 December), by hour of day.

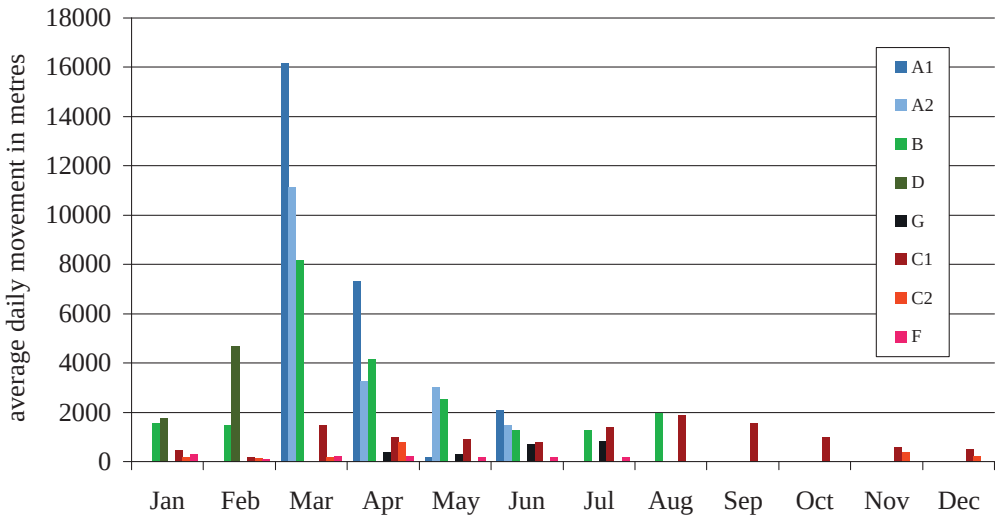

Figure 12. Average daily movements in metres by particular individuals. A1 = male A in 2004, A2 = male A in 2005, B = male B, D = male D, G = male G, C1 = female C during the period 08 Dec 2009 - 22 Jan 2011, C2 = female C during the period 29 Jan 2011 - 11 Feb 2012, F = female F.

effect of site-specific variations on the supply of prey, the spectrum of the mink diet is probably wider in range than these observations suggest.

During the monitoring period two pairs of marsh harrier (*Circus aeruginosus*) nested within a mink's territory. The minks went past the nest, within a short distance, several times, the male G slept three times within 15 m from the nest, when the chicks were about

Figure 13. Female mink with a caught brown rat. *Photo: V. Hlaváč.*

Figure 14. Water vole is a common prey of American mink. *Photo taken by camera trap.*

14 days old. However their nest was not damaged by mink and all the chicks successfully raised.

Parental behaviour

Two females, C and F, were monitored while preparing the nesting den and raising their cubs. One of the two females was radio-tracked for two years and the other for three years. The parental behaviour of each of these females was recorded twice: female C in 2010 and 2011 and female F in 2011 and 2012.

The first record of female C settling was made 28 April 2010. She chose a place in the middle of her home range in an embankment between a river and a fishpond, surrounded with sedge (*Carex buekii).* She stayed in the den without leaving the place at all but then left it after ten days.

The next year the same female settled in a root cavity of an elder tree (*Alnus glutinosa*) on 29 April 2011. She intensively prepared the den, bringing in grass and stayed there at least till 10 May 2011. No subsequent data are available because of the failure of the transmitter battery.

Female F was seen preparing her den in a similar way (though bringing in twigs) on 30 March 2011. The following year she found the place in the embankment between the river and the fishpond that was previously occupied by female C. She settled there on 5 May 2012 and had at least four cubs, which were firstly seen outside the den on 20 July 2012. This female was monitored throughout the whole rearing period. A great amount of data about cubs' behaviour was generated from the camera trap survey and telemetry.

The cubs were first observed outside the den at the age of 45 days. Ten days later the family moved to another den on the banks of the pond (about 100 m from the original nest). After eight more days they moved again, this time to an old pile of branches near a concrete culvert. They stayed there for a month (until 3 August), when the female was killed by a dog. By this time the cubs were fully grown. After the death of their mother they were not observed again. The last site was very suitable for animal observation, as all the animals had to use a concrete culvert to access it (figure 16). Whilst monitoring an otter regularly went past this den (figure 17) and a muskrat was also often seen on the site, although there were no interactions between them and the minks. The male G occupied the same area (the same fishpond) during the monitoring period although it was not clear, whether this male was the father of the cubs. It was, how-

Figure 15. A female mink bringing a duck to her cubs. *Photo taken by camera trap.*

Figure 16. The concrete culvert created good conditions for observing minks and other animals near the den. In this picture the mink family is returning to their den along the concrete culvert. *Photo taken by camera trap.*

ever, evident that he never contacted the cubs in the nesting den.

Discussion

Home ranges

The differences in home range size between the sexes and the overlap of male and female home ranges could be related to the distinctive sexual dimorphism in body sizes (Thom et al. 2004). The intrasexual territoriality in connection with overlaps in home ranges between the males and the females is also found in other mustelids (Dunstone 1993). This system of territoriality could minimise competition between the sexes. Sexual dimorphism in body size and the intersexual competition could result in the sexes having different behaviour and different ecological strategies.

Circadian activity

Several studies have explored the circadian activity of the American mink but their results have differed considerably. Diurnal activity of minks was proven by Harrington and Macdonald (2008) and Garcia et al. (2009), while nocturnal activity was found by Gerell (1970), Birks and Linn (1982) and Yamaguchi et al. (2003). A study by Zschille et al. (2010) showed circadian activity to be different between males and females, with females being quite active during the day and males primarily active during the night. By contrast a study by Niemimaa (1995) found no sexual difference in circadian activity.

Our results, based on observations of four males and three females, do show differences between male and female circadian activity. The males were strictly nocturnal, while the females were both diurnal and nocturnal. What might be the reason(s) for such obvious differences in behaviour?

One hypothesis could be that the (smaller) females seek to minimise body heat loss during cold nights. However, this hypothesis cannot be supported by the evidence, as females' nocturnal activities were the same during summer and the winter periods (with colder nights).

Intra-specific competition is another possible reason why males' and females' circa-

Figure 17. An otter regularly went past the mink den, at close distance, without any interspecies interactions. *Photo taken by camera trap.*

dian activities differ. As there is an overlap between the home ranges of males and females, it is possible that the activity of the smaller females is shifted to the daylight hours to avoid competitive pressure from the males.

Movements

The recorded average daily movement of females was approximately 1 km, while for males it was 4.5 km. The largest difference in movements was recorded in March and April, when males travelled up to 22 km during one night, the females showed the same mobility pattern as in other months and the longest distance they covered was 3.5 km/day in this period.

Male behaviour during March and April was strongly affected by their instinctive search for new females for mating. The females were quite sedentary and stayed in their territories during the mating period. This behaviour has also been confirmed in studies in other parts of Europe (Dunstone & Birks 1983, Ireland 1990, Yamaguchi et al. 2003).

Another increase in mobility was recorded during August and September. This behaviour may be caused by the dispersion of cubs and the efforts of older minks to protect their territories against the newcomers. This pattern was also observed by Beran (2005) and a higher trapping success (caused mainly by higher mobility) was recorded by Yamaguchi et al. (2002)

Summary and conclusions

Seven individuals of American mink (four males and three females) were radio-tracked on the Czech Moravian Highlands near Havlickuv Brod between 2004 and 2012. The animals were tagged with VHF transmitters, which were implanted into the abdominal cavity. The Kernel method was used to determine their home ranges, which were restricted to rivers, streams and ponds in the area.

The home ranges of males were significantly larger than those of females. The average size of male home ranges were 30.4 km of banks (more in the mating season), whereas the ranges of females were just 7.5 km. Overlaps between home ranges were recorded between males and females, with male ranges covering several females' ranges. Clear overlaps in same sex ranges were not recorded, except during the mating season, when males abandoned their territorial behaviour and occupied a larger area, probably with the aim of finding as many females as possible.

There were differences in circadian activity between males and females. Females were equally active during the day and night, whereas male activity was mostly limited to the night.

Differences in the movements of both sexes were also recorded. The males were able to cover a distance of up to 22 km during one night, while the longest distance covered by a female was just 5 km in 24 hours. The males were most mobile during March and April, while the females' mobility was relatively stable during the whole year. The mobility of both sexes was rather low during the winter.

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Samenvatting

Ruimtegebruik en voortplantingsbiologie van de Amerikaanse nerts in de Moravische Hooglanden (Tsjechië)

Zoals op veel locaties in Europa kreeg de Amerikaanse nerts (*Neovison vison*), oorspronkelijk ingevoerd als kweek-pelsdier, ook in de Tsjechische Republiek vaste voet aan de grond. Vanaf het begin van de jaren 1990 was er sprake van een duidelijke expansie. Doel van deze studie was informatie te verzamelen over de biologie en de ecologie (ruimtelijk gedrag, dag-nachtritme, voorplanting enz.) van deze invasieve exoot. Daartoe werd een beroep gedaan op klassieke radiotelemetrie (VHF-zender-onderzoek), aangevuld met de inzet van cameravallen en sporenonderzoek. De studie werd in de periode 2004-2012 uitgevoerd in de Moravische Hooglanden nabij Havlickuv Brod. Bij zeven Amerikaanse nertsen, vier mannetjes en drie wijfjes, werd een VHF-zendertje ingebracht. De home ranges werden globaal bepaald via de Kernelmethode en vervolgens herleid tot het totaal van waterlopen en ander aanwezig open water. De home ranges van de mannetjes waren significant groter dan die van de wijfjes. Bij de mannetjes bedroeg de gemiddelde oeverlengte binnen de home range 30,4 km (buiten de paartijd), terwijl dit bij wijfjes 7.5 km was. Home ranges van mannetjes bleken daarbij te overlappen met die van meerdere wijfjes, terwijl dit binnen hetzelfde geslacht niet het geval was. Uitzondering op dit laatste vond plaats tijdens de paartijd (maart – april), wanneer de mannetjes hun territoriaal gedrag verloren en grotere gebieden gingen gebruiken, kennelijk om zoveel mogelijk wijfjes te kunnen vinden. Een opmerkelijk verschil tussen mannetjes en wijfjes kon ook worden vastgesteld in het dag-nachtritme: terwijl wijfjes zowel overdag als 's nachts actief bleken te zijn, waren de mannetjes enkel nachtactief. Verder verschilden beide geslachten ook duidelijk inzake hun bewegingspatroon. Mannetjes waren in staat om in één nacht afstanden tot 22 km te overbruggen terwijl voor een wijfje de grootste geregistreerde verplaatsing binnen 24 uur vijf km bedroeg. De grootste mobiliteit bij de mannetjes werd in de paartijd waargenomen, terwijl deze bij de wijfjes relatief stabiel was over het hele jaar. Tijdens de winter was de mobiliteit van beide geslachten relatief laag.

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