SCENT MARKING BEHAVIOUR IN THE EURASIAN LYNX, *LYNX LYNX*.

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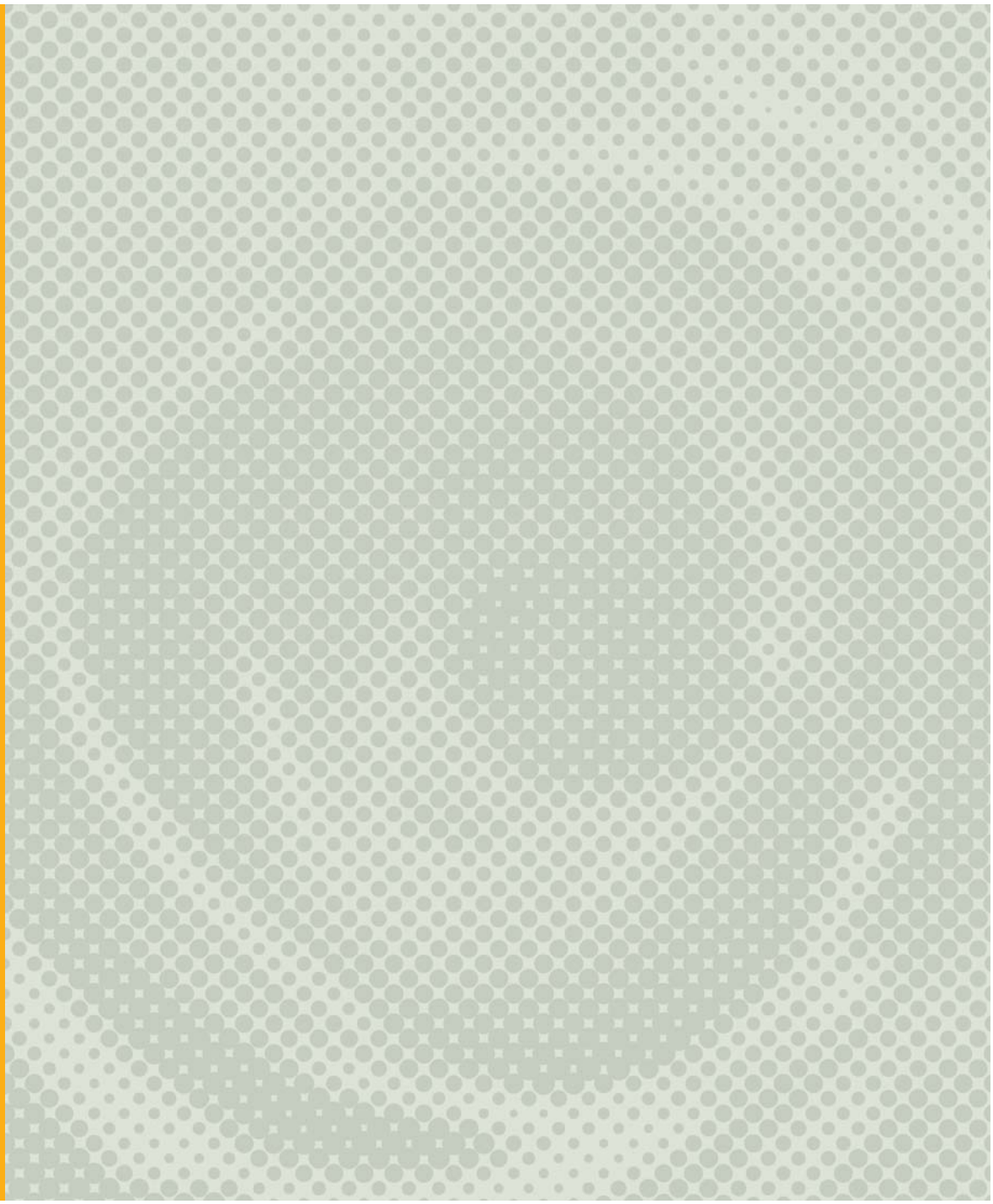

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MASTER THESIS 30 CREDITS 2007

PREFACE

My master in ecology was to write for the Norwegian Institute for Nature Research, NINA, on Eurasian lynx (*Lynx lynx)*. After five years of ecology, zoology and ethology studies at the Norwegian University of Life Sciences, scent marking behaviour in Eurasian lynx was an interesting master to write. My work has been to analyse snow-tracking data from 1995-1998 to see where lynx scent mark in their territory. The Eurasian lynx in Hedmark County have immense home ranges, and I found it interesting to see if they defended their territory any different than what we know from territory defence in other animals.

I would like to thank John Odden and John Linnell at NINA, the Norwegian Institute for Nature Research, Olav Hjeljord at UMB, Snorre R. Sæbø, Trine Bjørnerås and Bjørn Helge Mevik, Leif Rune Ulle, Henny Tonje Dovland, Lisa Steinnes Rø and my family for big encouragement and keeping my spirits up.

I would also give a special thanks to the field observers who has done this master possible.

This project is a part of the Scandinavian lynx research project Scandlynx (http://scandlynx.nina.no/). Scandlynx is cooperation between field researchers in Norway and Sweden, and has since 1994 studied lynx in 8 different study areas around Scandinavia. The project has been cooperation between the Norwegian Institute for Nature Research (NINA), the Norwegian University for Science and Technology (NTNU), the University for Life Sciences (UMB), Hedmark College and Grimsö Wildlife Research Station (SLU).

ABSTRACT

Home ranges of Eurasian lynx vary a great deal between different study areas in Europe. A male lynx in Hedmark use more than 1100 km^2 in average. The lynx is territorial and I wanted to investigate how the lynx uses scent markings in territorial defence. Approximately 800 km of snow tracking records were used in the analysis. Thirteen radiocollared lynx was included in the study; five males and eight females. They wore followed for together 336.9 km, rest of the kilometres were snow tracking of uncollared single and family groups.

Statistical analysis was performed to prove the marking frequency between radiocollared females and males. Males mark with a frequency twice the females per kilometre. Single lynx marked with the same frequency than family groups of lynx. A winter season was divided in three; early winter (November-December), midwinter (January-February) and late winter (March). The highest numbers of markings were made in the midwinter season. The lynx marked along their borders with a higher frequency than they did in the centre of their home range.

As predicted, lynx scent marked not differently than any other carnivores.

SAMMENDRAG

Hjemmeområdene til de europeiske gaupene varierer enormt i størrelse, og den eurasiske gaupa har de største hjemmeområdene registrert. En hanngaupe i Hedmark fylke har i gjennomsnitt et område på 1100 km^2. Gaupa er revirhevdende og i denne oppgaven ønsket jeg å vise hvordan gaupene bruker luktmarkeringer i forsvar av deres store territorier. For å gjøre det ble sporingsdata på 800 km med registrering av luktmarkeringer analysert. Til sammen ble 13 radiomerkede gauper inkludert i studiet, av disse var fem hanngauper og åtte hunngauper. Disse gaupene bidro med 336.9 km, resten av km var av ukjente enslige gauper og ukjente familiegrupper.

Statistiske analyser ble utført på markeringsfrekvens mellom kjente hann og hunn gauper. Hanner markerer dobbelt så mange ganger per kilometer sammenliknet med hunnene. Enslige gauper kontra familiegrupper viste ingen signifikant forskjell. Enslige gauper markerer med lik frekvens som en familiegruppe. På tvers av sesonger ble det funnet mest markeringer midtvinters (januar-februar). Gaupene markerte også signifikant mer langs grensene enn de markerte nær sentrum.

Gaupene markerer ikke tilfeldig, men plasserer luktmarkeringer i nærheten av grenser og kantsoner, dette bekrefter at gaupene markerer territoriet sitt likt som andre rovdyr.

CONTENTS

1. INTRODUCTION

Mammals mostly use acoustic, visual, olfactory and tactile signals as communication between individuals. The four different signals are used in mating systems, parental care, dominance, territory marking and recognition of individuals, foraging patterns and other behavioural features. Scent marks, also called social odours, are the most important signal transmission when it comes to giving animals different kinds of information on an individual's movement and behaviour. Olfactory signals can be used where other signals may be difficult to detect, for example in dense vegetation and by solitary animals. One of the advantages of scent marks is that they remain active for a long period of time, so other animals can smell the individual even when it is absent. When urine and faeces are used as scent marks, one is faced with the difficult problem of distinguishing between excretion and communication (Gorman and Trowbridge 1989). Small volumes of token urine and faeces, to use Macdonald's (1985) terminology, placed at frequently visited and perceptible sites, may be defined as communication markings.

Lions are the only felid that lives in a social hierarchy, the other species of the family felidae, lives solitary lives. Olfactory signals are therefore essential in their communication. Most felids use urine as a scent mark. Males spray backward between their legs onto rocks, cabin corners, trees and other places for attention (e.g. African lion, *Panthera leo*: Schaller 1972; cheetah, *Acinonyx jubatus*: Eaton 1973; mountain lion, *Felis concolor*: Hornocker 1969; bobcat, *Lynx rufus*: Bailey 1974; tiger, *Panthera tigris*: Schaller 1967; Canadian lynx, *Lynx Canadensis*: Saunders 1963). For territory markings several felids show tendencies to defecate along tracks and on top of objects, only within the core areas of their ranges do domestic cats (*Felis catus*) and Scottish wildcats (*Felis silvestris*) bury their faeces; elsewhere they are left prominently displayed (Panaman 1981; Macdonald 1985).

Home ranges of Eurasian lynx vary by a factor of 10 between different study areas in Europe, and this variation is linked to prey density (Herfindal *et al*. 2005). The home ranges used by lynx in Hedmark County in south-eastern Norway are the largest ever recorded for lynx. A male lynx in Hedmark use more than 1100 km^2 in average (Linnell *et. al.* 2001). As reported for lynx in Poland and Switzerland (Breitenmoser *et al.* 1993; Schmidt *et al*.1997) lynx of both sexes in Hedmark also show relatively little home range overlaps within sex (Andersen

et al. 2005). The question is how territoriality can function in populations with such extremely large home ranges.

Territory owners should not mark at random but place marks around the territory boundary and along routes usually taken by intruders to increase the chance of detection (Gosling 1982). This study has investigated the scent marking behaviour of Eurasian lynx by following tracks of radiocollared and uncollared lynx in the snow. The aim has been to investigate lynx use of scent marks in relation to territory boundaries, how scent marking frequencies vary between different sexes, single and family groups and during the winter season.

2. MATERIALS AND METHODS

2.1 Study area

The study area was situated in Hedmark county in the south-eastern part of Norway (61º15' N, 11º30' W). The region's vegetation is predominantly boreal coniferous forest, and most of the study area is covered with woodland. Scots pine (*Pinus sylvestris*) and Norwegian spruce (*Picea abies*) dominate the forest. Birch (*Betula sp.*) may also be well represented, especially in the forest-alpine tundra interface and along rivers. Non-forest habitats consist mainly of bogs, and alpine-tundra above tree line. Agricultural lands make up less than 5 % of the area, and occur mainly in valley bottoms. The topography consists of several parallel river valleys running from north to south at about 200 –500 m above sea level, separated by hills ranging from 600 – 900 m. a. s. l. Generally the terrain is steeper in the western and northern part of the area.

A wide range of wild mammal and bird species are available as potential prey for the lynx. Roe deer are available in most parts of the study area, but at very low densities. In winter, roe deer are clustered in valley bottoms and close to supplemental feeding sites, but in summer they can be found anywhere in the forested part of the study area. Wild reindeer (*Rangifer tarandus*) are found in the north-western part of the area during summer, while red deer (*Cervus elaphus*) occur sporadically and at very low density. Moose (*Alces alces*) occur in high numbers. A wide range of small prey species are also available. The most important are hare (*Lepus timidus*), red fox (*Vulpes vulpes*), capercaillie (*Tetrao urogallus*) and black grouse (*Tetrao tetrix*). The distribution of domestic sheep within the area is widespread but patchy, although any potential lynx home range would contain at least some grazing sheep,

and sheep density is highest in the western and northern parts. Sheep are grazed in the forest, without fences or supervision from June until September.

The climate is continental with warm summers and cold winters. Average January and July temperatures are –10ºC and 15ºC, respectively. Average annual precipitation amounts to 500-1000 mm. Snow conditions vary, but usually the ground is covered with snow from November until April. The midwinter snow depths typically vary from 50 cm to over 200 cm.

2.2 Lynx capture and data collection

Between 1995 and 1999 a total of 42 lynx were captured and equipped with radio-transmitters using a variety of techniques, including box-traps, spring-loaded foot-snares, dogs, darting from car and helicopter or capture (by hand) at natal lairs (see Arnemo *et al.* 1999, 2006; Odden *et al*. 2006 for a detailed description). All procedures were approved by the Norwegian Experimental Animal Ethics Committee, and permits for wild animal capture were obtained from the Directorate for Nature Management. Most animals were equipped with radio-collars, apart from neonatal kittens and some few 6 month old kittens that received free-floating intraperitoneal implant transmitters (Arnemo *et al.* 1999, 2006). Collars weighed 120 g. or less than 1% of an adult female (Telonics Inc.).

In winter it was obtained sequential, daily radio-locations from lynx, and their tracks were followed in the snow between the daily radio-locations. They also followed tracks from unmarked lynx. During snow-tracking, data collected included the distance travelled by the lynx, date, sex (if known), how deep the snow was, age of the lynx (if known), age of the track (if known) and whether the lynx was single or in a family group. Where the lynx had day lairs, where it had marked, and the kills was written with numbers on a map-copy.

The radio-collared lynx were relocated at least once or twice per month as a minimum sample. Aircraft were used mainly for this regular work to reduce any possible biases due to the animal's location with respect to roads. Additionally more intensive radio-tracking from both the ground (cars or snowmobiles) and the air was carried out during different periods.

2.3 Data analysis

Field observations were systemized and every urine and faeces markings was counted, meaning; every marking in every kilometre for each observation day. For best precision when

following the drawn up routes on maps, SILVA map measurer was used; coordinates of every kilometre was then written with all the other information in a spreadsheet (see Appendix I).

2.3.1 Frequency analysis

Descriptive frequency analysis was made on how much every known female versus male (Tab. 1) and every single lynx versus family group (Tab. 2), marked. Seven of the eight females in table 1 are studied in family groups and not individually. We know from studies made on the Canadian lynx that it is the mature female who places every marking (Saunders 1963). Both unknown and known lynx are considered in table 2. Most of the kilometres from family groups are of known lynx (170 km).

2.3.2 Arc View analysis

No home ranges were calculated when less than 20 locations were available for an annual home range. The data were analyzed using the Ranges VI computer program (Kenward and Hodder 1996). Home range areas were calculated using the 100% minimum convex polygon (MCP). Home range borders were imported in to Arc View together with the snow tracking routes that described every distance tracked and markings made on known lynx. In a few cases we did not have enough locations to calculate a home range. In these cases we used home range border from the year after.

Points were marked at one km interval along the track (later referred to as “km points”) and their distance to the centre measured in Arc View. Centre in the home range was calculated as kernel centre in Ranges VI computer program. The same was done with the distance between km points to the border of home range. Furthermore, the distance to the polygon border was calculated in GIS program- ArcView. In the analysis’s only kilometre with markings were used.

2.4 Statistical analysis

Statistical analysis was performed using the Minitab computer package. Since data samples were small, nonparametric analyses were used. Differences in markings between males and females (only known lynx were included), single lynx and family groups (all lynx in this study included) and across seasons (only known lynx) were compared using Kruskal-Wallis Test. To test markings across seasons the winter was divided into three; early winter: November - December, midwinter: January - February and late winter: March.

Lynx less than one year old were excluded from the analysis for the reason that we can't expect young, independent kittens to mark at the same frequency as older lynx trying to establish a territory. A minimum distance criterion was used; tracking records less than 5 km were not used. In the analysis between males and females all the known individuals were compared whether they wore single lynx or in a familygroup. Ingrid was the only female that was tracked as single; all other known females were in a familygroup. Peer and Bøygen were two males that were tracked both individually and in a family group.
The definition of a family group in this study was more than one lynx. From June till February females live sociable lives when they have young of the year. For most females this means one or two kittens. From late February to the beginning of May mature adults stay together for mating.

To analyse the difference in scent marking in relation to home range borders and centres, the distance between markings in relation to centre or borders were calculated in Arc View. This distance was then computed in Minitab. The program was asked to scale the distances that were calculated in Arc View in one figure (Fig. 1). The rod 0.0 represents the markings nearest to the border, and the rod 1.0 represents markings nearest to the centre. A null hypothesis was used to determine the *P*- value and the value was found using the R version 2.5.0 computer program.

3. RESULTS

Approximately 800 km with records on scent marking behaviour was analysed.
Males show on average a higher marking frequency than females (Tab. 1). They mark twice as much as females per km ($H = 15.94$, df = 1, $P = 0.000$).
"Odin" and "Tyra" were the two individuals that urinated most frequently." Odin" had a frequency of spraying urine 6 times per km tracked. The female, "Tyra" was found to be urinating 4 times per km tracked. According to the information sheet she visited by an unmarked lynx, possibly a male in part of this period.
In markings across seasons on known lynx the highest markings were found in the midwinter season, January – February ($H = 6.82$, df = 2, $P = 0.033$). Very few snow tracks are recorded in the other two seasons; early winter (Nov-Dec) and late winter (March) (see Appendix II).

Table 1. Marking frequencies between males and females of the Eurasian lynx in Hedmark County 1996 – 1998.

Lynx	Sex	Total km	Total mark.	Mark. per km
Peer	M	6,2	10	1,61
Aslak	M	52,7	17	0,32
Våler	M	21,7	23	1,06
Bøygen	M	17,8	16	0,90
Odin	M	36	186	5,17
Helga	F	14,5	8	0,55
Ingrid	F	39,9	11	0,28
Nora	F	18,9	17	0,90
Hedda	F	13	8	0,62
Gyda	F	71,2	60	0,84
Ulla	F	7	2	0,29
Tyra	F	24	91	3,79
Oda	F	14	4	0,29
		Marking freq. Males		1,81
		Marking freq. Females		0,94

Markings by single lynx versus family groups included all lynx and revealed no differences in marking frequency per kilometre ($H = 1.71$, df = 1, $P = 0.191$, Tab. 2).

Table 2. Marking frequencies of single and family groups of the Eurasian lynx in Hedmark County 1996 – 1998.

Lynx	Sex	Total km	Total mark.	Mark. pr km
Single	Mixed	564,1	452	0,80
Familygr.	Mixed	214,9	238	1,11

There were more markings near borders than in the centres of territories ($P = 1.14 * 10^{-11}$, figure 1). The animals were found to mark 91 times out of a total of 114 markings within territory near borders, and only 23 times did they mark near home range centres.

Females were seen travelling outside their territories. When they travel, it has been observed that they are placing scent marks along their paths (see Appendix III). Because of very little data on these markings, no statistical analysis was made. A reason for this behaviour will be discussed later in the paper.

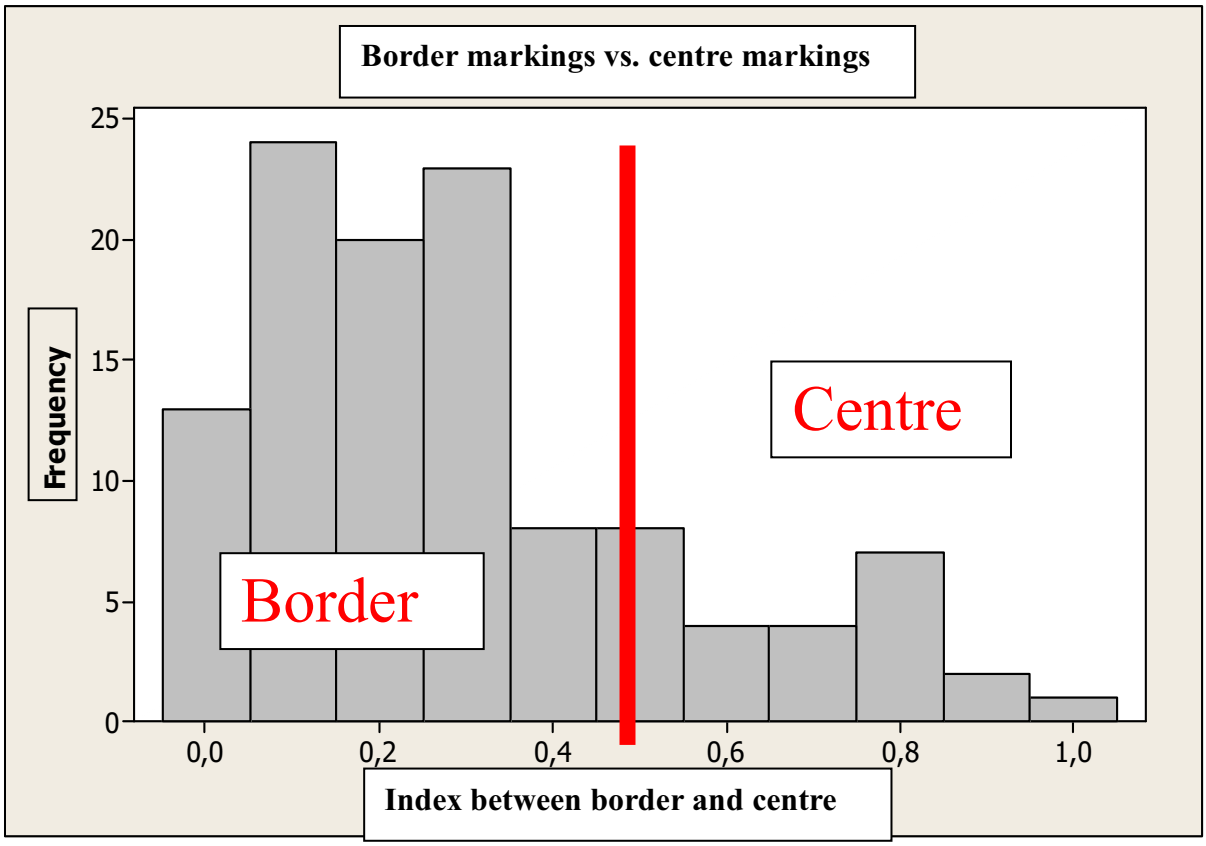

Figure 1. Lynx markings near the border: 0.0 – 0.5. Lynx markings near the centre: 0.51 – 1.0. Markings closest to the border are grouped in bar 0.0. Markings closest to the centre are grouped in rod 1.0.

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4. DISCUSSION

4.1 Territorial defence

Scent marks give a valuable impression in how the lynx defend their territories despite huge home ranges, and as predicted in this study lynx marked more next to the borders than to the centres of their home ranges. There was no difference in markings between single lynx and family groups. Males scent marked their territory more than females, and the highest amount of markings was found in the midwinter season (Jan-Feb).

Scent marks provide a spatial and historical record of an individual's movement and behaviour. It can be used when visual or auditory signals are difficult to detect, for example at night, under the ground, or in dense vegetation (Gorman and Trowbridge 1989). Scent marks as signals, have the important possessions of remaining active for long periods, even in the absence of their producer (Gorman and Trowbridge 1989). Odours as scent marks are therefore very much important in communication between solitary animals.

4.1.1 Scent marks in relation to the border

As predicted, lynx did not mark at random like lions apparently do (Schaller 1972), but place their markings more frequently closer to the territory boundary. One reason for this is may be that transient animals will quickly realize that they are trespassing into a defended area. When lynx have settled in a territory , they use a great deal of energy in getting to know its areas and its resources. Resident lynx will have more to gain by staying in their territory than intruders have from taking it over (Gosling 1982).

Cheetahs have been seen to walk in the opposite direction when detecting scent markings of other cheetahs (Eaton 1973). Saunders (1963) experienced one time that a Canadian female lynx and male met at approximately 45 m distance. They both froze and stood still for some time, then the male receded 45 m. After the female had passed him he continued on his way. If intruder and resident animals do meet it is usual that the intruder withdraw without fighting (Gorman and Trowbridge 1989).

Barrette and Messier (1980) discovered that coyotes marked at the highest rates at places where intrusion by neighbours was most common, and Mills *et. al*. (1980) showed that even brown hyenas place most marks inside of their territory, the rate of marking per kilometre travelled increased at the border. In common with canids, some felids are found to urinate frequently: bobcats sprayed at a frequency of 7. 5 times per km travelled (Bailey 1974), Schaller (1967) tracked one tiger which sprayed urine 11 times in 30 minutes, and Panaman (1981) found that domestic cats' maximum number of sprays was 18 in an hour. Saunders (1963) found that the Canadian lynx sprayed urine with a frequency of 17-20 times a mile (app. 11. 5 per km). The marking frequency in the male lynx in this study was 6 times per km and therefore somewhat lower than other felids. The female marked with a frequency to four times per km. One reason for this may be that because their territory is so large it takes a lot of energy to cover the borders with scent marks; so the frequency between markings are lowered and only sprayed at paths often used.

4.1.2 Scent marks determine reproduction state

Many species seems to be able to determine an individual's gender using olfactory cues (Gorman and Trowbridge 1989). In some cases this opinion may be a result that scent marks are positioned in different ways, or in different quantities, by the two sexes. Urine is a potentially rich source of information concerning reproductive state.

Mating season in this part of Scandinavia is from middle of March to the beginning of April (J. Odden unpublished data). In many species the frequency of scent marking increases markedly in the breeding season, and particularly during courtship as the female approaches oestrus (Gorman and Trowbridge 1989). In this paper the highest marking frequency appeared in the midwinter season (Jan-Feb). It must be taken into consideration that no scent markings were recorded in the late winter season (March) in 1997, scarcely in 1996 and only of females in 1998 (see Appendix II).

4.1.3 Scent marks are placed in visible sites

We know from earlier studies made on the Canadian lynx (Saunders 1963) that kittens bury their scats and urine with mould and snow during their first year of life. Kittens do, for that reason, not increase the frequency of markings between single lynx and familygroups.
Near lynx day lairs, faeces were for the most part found buried in the same manner as the domestic cats did in the core of their home range (Panaman 1981), but along tracks faeces were left promptly in sight. Both females and males were found urinating on cabin corners, rocks and roots for attention and next to paths easy for other lynx to detect. Faeces were found prominently displayed next to where they had travelled.
Barrette and Messier (1980), for example, discovered that coyotes marked at the highest rates at places where intrusion by neighbours was most common, and Mills et al. (1980) showed that although brown hyenas place most marks in the interior of their territory, the rate of marking per kilometre travelled increases at the border.

4.1.4 Home range overlap and trespassing between territories

Females choose their territories according to prey because they depend on high prey densities for raising their kittens. Males prefer home ranges near one or two females to grant access to copulation (Fig. 2 and 3).
Hornocker (1969) found that resident male mountain lions never shared territories, but transient males and females could move freely through inhabited territories without encountering aggressiveness over territory intrusion. An old male resident even avoided a young transient male, though the young male had killed an elk and stayed at the kill. In this paper the female lynx's "Helga" and "Hedda" was recorded outside their home range to some degree. When they are on these excursions they are observed placing scent marks. Females are found to be travelling in autumn and early winter, and males travel more in addition to the mating season (Odden *et.al.* 2002). According to Gittleman (1989) animals often cease to

place scent marks indicating that they are well aware that they are trespassing an area that is occupied.

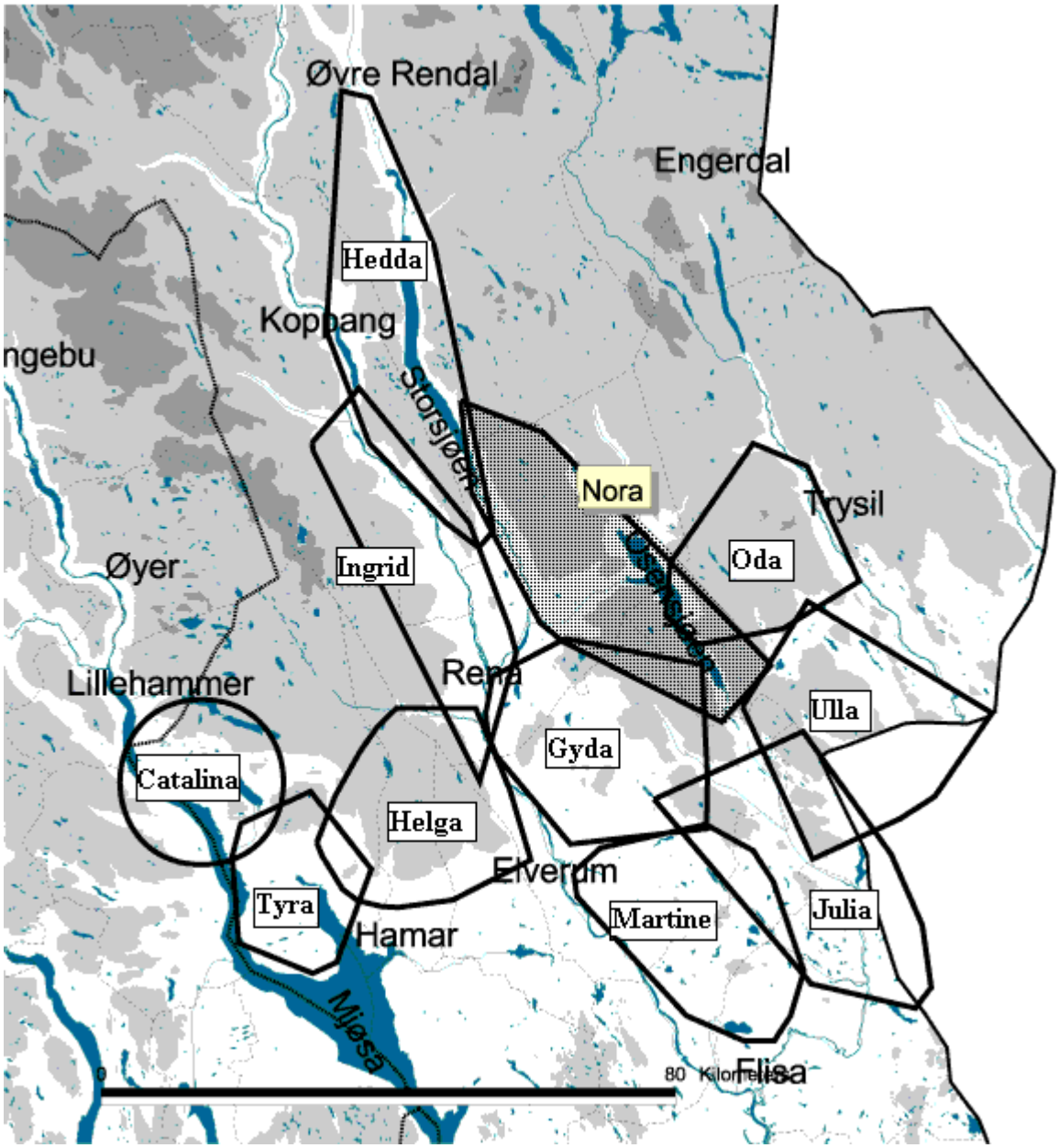

Figure 2. Home ranges of tagged female lynx in Hedmark County, Østerdalen (*Scandlynx.no*).

The Canadian female lynx are found to be less tolerant of each other while male lynx showed greater tolerance of the same sex (Eaton 1973). Breitenmoser *et.al.* (1993) found that the Eurasian lynx in the Swiss Jura Mountains had overlapping home ranges, but the core areas were totally separated. The males had significantly larger overlap in their home ranges than females, but there was no evidence that resident animals met. There is no examples from the literature of female lynx are observed cooperating at any level. Although males seemed to

control and scent marks the borders in a pattern, they were never close to a border if the neighbour already was in the area Breitenmoser *et.al.* (1993). In this paper the males was never observed in each others territory. They were not recorded to have been close to each other in the same matters as for the females either. Schmidt *et.al.* (1997) found that male lynx had an average of 30 % in overlapping home ranges, the females had only 6 % overlap.

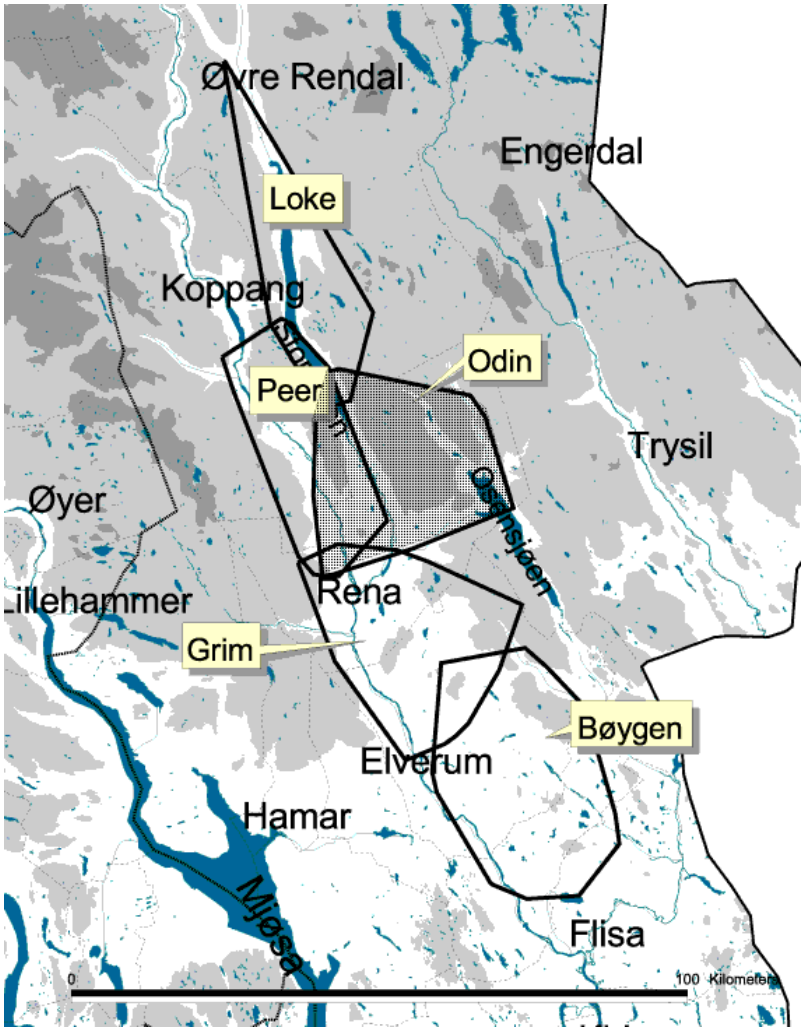

Figure 3. Home ranges of tagged male lynx in Hedmark County, Østerdalen (*Scandlynx.no*).

Interdigital glands, scratch marks, have been seen in behaviour of African lions (Schaller 1972); several lions scratched the same tree, and this particular tree was visited repeatedly for this reason. Panaman (1981) describes the same behaviour for domestic cats, but no significant pattern or communication was shown with scratching. Saunders (1963) found that free-ranging Canadian lynx only scratch marked a few times. This is thought to be a method of sharpening claws (Macdonald 1985).

Very few scratch marks were recorded in the field data on lynx in this study which may support the hypothesis of sharpening the claws.

Acoustic signals, mating cries, can be heard from lynx all year, but with increasing frequency in their mating season (J. Odden pers.com.). How important this is in maintaining territories has not yet been established but must be taken into consideration. Clearly scent marking is an important signal for communication. Exchange of olfactory signals between solitary cats gives them the opportunity to continue their solitary lives.

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Lynx	Sex	Total km	Total mark.	Mark. pr km	Km 95	Marks 95	Freq. 95	Km 96	Marks 96	Freq.96	Km 97	Marks 97	Freq.97	Km 98	Marks 98	Freq.98
Peer	M	6.2	10	1.61	1.6	0	0.00	4.6	10	2.17	0	0	0.00	0	0	0.00
Aslak	M	52.7	17	0.32	21.7	8	0.37	31	9	0.29	0	0	0.00	0	0	0.00
Våler	M	21.7	23	1.06	0.0	0	0.00	21.7	23	1.06	0	0	0.00	0	0	0.00
Bøygen	M	17.8	16	0.90	0.0	0	0.00	13.9	13	0.94	3.9	3	0.77	0	0	0.00
Odin	M	36	186	5.17	0.0	0	0.00	0	0	0.00	3.6	20	5.56	32.4	166	5.12
Helga	F	14.5	8	0.55	0.0	0	0.00	14.5	8	0.55	0	0	0.00	0	0	0.00
Ingrid	F	39.9	11	0.28	0.0	0	0.00	39.9	11	0.28	0	0	0.00	0	0	0.00
Nora	F	18.9	17	0.90	0.0	0	0.00	4.2	2	0.48	10	10	1.00	4.7	5	1.06
Hedda	F	13	8	0.62	0.0	0	0.00	0	0	0.00	13	8	0.62	0	0	0.00
Gyda	F	71.2	60	0.84	0.0	0	0.00	22	14	0.64	9.5	12	1.26	39.7	34	0.86
Ulla	F	7	2	0.29	0.0	0	0.00	0	0	0.00	0	0	0.00	7	2	0.29
Tyra	F	24	91	3.79	0.0	0	0.00	0	0	0.00	0	0	0.00	24	91	3.79
Oda	F	14	4	0.29	0.0	0	0.00	14	4	0.29	0	0	0.00	0	0	0.00
		336.9														
				Markingfreq. Males												
Unknown sin	Unknown	**397.2**		1.81			**0.37**			**1.11**			**3.16**			**5.12**
Unknown fam	Unknown	**44.9**		Markingfreq. Females												
				0.94			**0.00**			**0.45**			**0.96**			**1.50**
		779														

Single	Mixed	564.1	452	0.80
Familygroup	Mixed	214.9	238	1.11
		779		

ControlNr	kmid	IDLynx	AGE	SEX	LY_NR	zone	x	y	urine	faeces	map
GSS950110JO01	0	UKJENT			1	32v	6461	67911	0	0	Julussa
	1						6460	67920	0	0	
	2						6452	67920	0	1	
	3						6442	67918	0	0	
GSS950113JK01	0	UKJENT			1	32v	6392	67937	0	0	Nordre Osen
	1						6383	67935	0	0	
	2						6373	67935	0	0	
	2,8						6365	67934	0	0	
GSS950117JK01	0	UKJENT			1	33v	3465	67565	0	0	Kynna
	1						3457	67561	0	2	
	2						3452	67552	0	2	
	3						3454	67540	0	0	
	4						3456	67534	0	0	
GSS950127JO01	0	UKJENT			1	32v	6286	67770	0	0	Rena
	1						6287	67776	2	0	
	2						6292	67772	2	1	
	3						6290	67780	5	0	
	4						6291	67796	2	0	
	5						6290	67804	0	0	
	6						6297	67806	0	0	
	7						6302	67799	0	0	
	8						6308	67797	0	0	
GSS950130JK01	0	UKJENT			1	32v	6286	67777	0	0	RENA
	1						6287	67786	0	0	
	1,5						6287	67789	0	0	
GSS950131JO01	0	UKJENT			1	32v	6243	67831	0	0	Rena
	1						6244	67837	0	0	
	2						6242	67839	0	0	
	3						6243	67841	0	0	
	4						6243	67843	0	0	
	5						6250	67847	0	0	
	6						6246	67856	0	0	
	7						6250	67859	0	1	
GSS950131JK01	0	UKJENT			1	32v	6281	67761	0	0	Rena
	1						6286	67767	0	0	
	2						6285	67775	0	0	
GSS950202JO01	0	UKJENT			1	32v	6312	67817	0	0	Rena
	1						6306	67820	0	0	
	2						6312	67818	0	0	
GSS950203JO01	0	UKJENT			2	32v	6379	67855	0	0	Ulvåa ??
	1						6378	67862	0	0	
	2						6379	67855	0	0	
nytt kart	0						6376	67861	0	0	
	1						6369	67856	0	0	
	2						6365	67846	0	0	
	3						6363	67858	0	0	
GSS950208JK01	0	UKJENT			2	32v	6372	67844	0	0	Ulvåvoll ??
	1						6369	67855	0	0	
	2						6371	67862	0	0	
	2,5						6372	67869	0	0	
GSS950211JK01	0	UKJENT			1	32v	6465	67946	0	0	??
	1						6473	67943	0	0	
	2						6483	67946	0	0	
	3						6494	67943	0	0	
	4						6503	67940	0	0	
	4,5						6510	67942	0	0	
GSS950213MD01	0	PEER	AD	M	1	32v	6085	68221	0	0	Koppang
	1						6095	68225	0	0	
	1,6						6095	68228	0	0	
GSS950214JK01	0	UKJENT			2	32v	6189	67445	0	0	??
	1						6184	67440	0	0	
	2						6178	67434	0	0	
	2,5						6176	67431	0	0	

GSS950217OKS01	0	UKJENT			1	32v	6168	68298	0	0	Storsjøen
	1						6167	68308	0	0	
	2						6165	68317	0	0	
	3						6164	68326	0	0	
	4						6162	68337	0	0	
	5						6158	68345	0	0	
	6						6158	68357	0	0	
	7						6154	68366	0	1	
	8						6151	68367	0	0	
	9						6155	68368	0	0	
	9,7						6374	68153	0	0	
GSS950216JO01	0	UKJENT			1	32v	6532	67877	0	0	Søre Osen
	1						6537	67874	0	0	
	2						6540	67864	0	0	
	3						6530	67867	0	0	
	4						6525	67878	0	0	
	5						6529	67890	0	0	
	6						6526	67900	0	1	
	7						6533	67907	0	0	
	8						6540	67914	0	0	
	9						6546	67919	0	0	
	10						6550	67925	0	0	
	11						6557	67936	0	0	
GSS950221JO01	0	UKJENT			1	32v	6485	67925	0	0	?
	1						6474	67923	0	0	
	2						6470	67914	0	0	
	3						6467	67909	0	0	
	4						6469	67900	0	0	
	5						6467	67895	0	0	
	6						6473	67888	0	0	
	7						6468	67881	0	0	
	8						6463	67876	0	0	
	9						6460	67866	0	0	
	10						6455	67860	0	0	
	10,4						6452	67858	0	0	
GSS950301JO01	0	UKJENT			1	32v	6294	67810	0	0	Julussa
	1						6301	67818	0	0	
	2						6307	67826	0	0	
	3						6315	67830	0	0	
	4						6324	67829	0	0	
	5						6334	67836	0	0	?
	6						6324	67840	0	0	Julussa
	7						6313	67837	0	0	
	8						6302	67831	0	0	
	9						6304	67822	0	0	
	10						6289	67815	0	0	
GSS950302JO01	0	UKJENT			1	32v	6586	67853	0	0	Søre Osen
	1						6582	67844	0	0	
	2						6573	67845	0	1	
	3						6570	67856	0	0	
	4						6572	67860	0	0	
	4,6						6566	67858	0	0	
GSS950309JK01	0	UKJENT			1	32v	6305	67853	0	0	Rena
	1						6315	67849	0	0	
	2						6319	67840	0	0	
	3						6311	67838	0	0	
	4						6307	67833	0	0	
GSS950316JO01	0	MADS	>1ÅR	M	1	32v	6476	67936	0	0	Julussa
	1						6485	67931	0	0	
	2						6494	67926	0	0	
	3						6495	67915	0	0	
	4						6502	67907	0	0	
	5						6500	67898	0	0	
	6						6508	67890	0	0	

	7						6517	67884	0	0	
	8						6526	67880	0	0	
	9						6532	67870	0	0	Søre Osen
	10						6541	67865	0	0	
	11						6544	67856	0	0	
	12						6545	67851	0	0	
	12,6						6542	67853	0	0	
GSS950321JO01	0	MADS	>1ÅR	M	1	32v	6388	67851	0	0	Ulvåa ??
	1						6380	67860	0	0	
	2						6376	67866	0	0	
	3						6382	67868	0	0	
	4						6391	67868	0	1	
GS950321JO02	0	UKJENT			1	32v	6341	67815	0	0	??
	1						6351	67821	0	0	
	2						6361	67821	0	0	
	3						6365	67828	0	0	
	4						6370	67838	0	0	
	5						6376	67848	0	0	
	6						6378	67854	0	0	
	7						6383	67864	0	0	
	8						6386	67872	0	0	
	9						6382	67877	0	0	
	10						6371	67876	0	0	
	10,2						6368	67877	0	0	
GSS950328JO01	0	ASLAK	AD	M	1	32v	6516	67962	0	0	Nordre Osen
	1						6522	67953	0	0	
	2						6529	67947	1	0	Jordet
	3						6538	67950	0	0	
	4						6545	67950	0	0	
	0						6547	67919	0	0	Søre Osen
	1						6550	67929	0	0	
	2						6551	67937	0	1	
	3						6555	67947	0	0	Jordet
GSS950429JO01	0	UKJENT			1	32v	6525	68041	0	0	??
	1						6528	68051	0	0	
	1,4						6350	68055	0	0	
GSS951101MD01	0	ASLAK	AD	M	1	32v	6512	67916	0	0	Julussa
	1						6507	67923	3	0	
	2						6499	67926	0	0	
	3						6490	67921	0	0	
GSS951103MD01	0	UKJENT			1	32v	6410	68047	0	0	Nordre Osen
	1						6415	68039	0	0	
	2						6425	68035	0	0	
	2,5						6429	68032	0	0	
GSS951106MD01	0	UKJENT			1	32v	6461	68009	0	0	Nordre Osen
	1						6445	68007	0	0	
	2						6435	68008	0	0	
	3						6425	68006	0	0	
	4						6415	68004	0	0	
	5						6405	67999	0	0	
	6						6400	67998	0	1	
	7						6400	68006	0	1	
	8						6406	68005	0	0	
	8,7						6411	68001	0	0	
GSS951111MD01	0	UKJENT			1	32v	6353	67825	0	0	Julussa
	1						6363	67828	0	0	
	2						6373	67826	0	0	
	3						6374	67831	1	2	
GSS951111MD01	0	UKJENT			1	32v	6375	67856	0	0	Julussa
	0,3						6372	67857	2	0	
GSS951114MD01	0	UKJENT			1	32v	6462	67997	0	0	Nordre Osen
	0,4						6461	68002	0	0	
GSS951129RB01	0	UKJENT			1	32v	6547	67415	0	0	Elverum
	0,5						6546	67407	0	0	

GSS951129MD01	0	UKJENT			1	32v	6410	68079	0	0	Nordre Osen
	0,6						6411	68085	2	0	
GSS951201EN01	0	UKJENT			1	32v	6285	67700	0	0	Rena
	1						6283	67708	0	0	
	2						6276	67715	0	0	
	3						6279	67723	0	0	
	4						6286	67728	0	0	
	5						6285	67738	0	0	
GSS951201JO01	0	UKJENT			1	32v	6370	67873	0	0	Julussa
	1						6365	67867	0	0	
	2						6360	67867	0	0	
	3						6352	67859	1	0	
	4						6355	67851	0	0	
	5						6360	67860	1	0	
	6						6367	67868	0	0	
GSS951203MD01	0	UKJENT			1	32v	6339	67947	0	0	Nordre Osen
	1						6332	67945	0	1	
	1,6						6326	67945	0	1	
GSS951204LG01	0	UKJENT			1	32v	6354	67801	0	0	Julussa
	1						6361	67805	0	0	
	2						6368	67803	0	0	
	3						6370	67811	0	0	
	3,4						6371	67816	0	0	
GSS951205MD01	0	UKJENT			1	32v	6385	67834	0	0	Julussa
	1						6388	67835	3	0	
	2						6384	67843	0	0	
	3						6388	67853	0	0	
GSS951205MD01	0	UKJENT			1	32v	6391	67860	0	0	Julussa
	1						6384	67857	0	0	
	2						6378	67861	0	0	
	3						6386	67864	0	0	
	3,4						6391	67860	0	0	
GSS951205EN01	0	UKJENT			1	32v	6271	67763	0	0	Rena
	1						6267	67760	0	0	
	2						6265	67754	0	0	
	3						6264	67742	0	0	
	3,6						6260	67740	0	0	
GSS951207MD01	0	UKJENT			1	32v	6385	67835	0	0	Julussa
	1						6375	67832	1	0	
	2						6367	67827	5	0	
	3						6364	67817	7	0	
	4						6361	67806	3	0	
	5						6357	67797	2	0	
	5,3						6355	67795	0	0	
GSS951209MD01	0	UKJENT			1	32v	6288	67705	0	0	Rena
	1						6292	67698	1	0	
	2						6285	67703	1	0	
	3						6285	67706	0	0	
	4						6279	67692	0	0	
	4,5						6275	67695	0	0	
GSS951210EN01	0	UKJENT			1	32v	6326	67920	0	0	Rena
	1						6327	67912	0	0	
	2						6327	67902	0	0	
	3						6328	67894	0	0	
	4						6335	67894	0	0	
	5						6335	67895	0	0	
	6						6332	67898	0	0	
	7						6336	67890	0	0	
	8						6328	67884	0	0	
GSS951213MD01	0	ASLAK	AD	M	1	32v	6560	67930	0	0	Søre Osen
	1						6555	67936	0	0	
	2						6550	67928	2	0	
	3						6550	67931	1	0	
	4						6545	67931	0	0	

	5				6534	67934	0	0	
	6				6528	67944	0	0	Jordet
	7				6524	67955	0	0	Nordre Osen
	8				6515	67961	0	0	
	9				6515	67968	0	0	
	10				6510	67970	0	0	
	11				6502	67978	0	0	
	11,7				6499	67987	0	0	
GSS951216MD01	0	UKJENT	1	32v	6293	67808	0	0	Rena
	1				6287	67798	0	0	
	2				6288	67788	0	0	
	3				6281	67790	0	0	
	4				6283	67801	0	0	
	4,1				6285	67803	0	0	
GSS951230MD01	0	UKJENT	1	32v	6389	67856	0	0	Julussa
	1				6384	67846	0	2	

ControlNr	kmid	IDLynx	AGE	SEX	LY_NR	zone	x	y	urine	faeces	map
GSS960115JTR01	0	UKJENT			1	32v	6311	68028	0	0	EVENSTAD
	1						6315	68019	0	1	
	2						6314	68010	0	1	
	3						6327	68000	0	0	NORDRE OSEN
	4						6333	67994	0	1	
	5						6327	67986	0	1	
	6						6326	67980	0	0	
	7						6317	67972	0	1	EVENSTAD
	8						6315	67981	0	2	
GSS960115LG01	0	HELGA?	AD	F	3	32v	6284	67750	0	0	RENA
	1						6286	67757	0	0	
	2						6284	67757	0	1	
	3						6278	67757	1	0	
	4						6274	67750	0	0	
	5						6268	67747	0	0	
	6						6263	67740	0	0	
	7						6255	67745	1	0	
	8						6244	67745	0	0	
GSS960116TU01	0	?	AD	F	?	32v	6104	68131	0	0	MYKLEBYSJØEN
	1						6093	68131	1	1	
	0						6078	68156	0	0	
	1						6070	68160	1	0	
GSS960116MD01	0	UKJENT			1	32v	6454	68138	0	0	NORDRE OSEN
	1						6456	68135	0	0	
	2						6456	68128	0	0	
	3						6455	68124	0	0	
	4						6455	68120	0	0	
GSS960117JO01	0	UKJENT			1	32v	6401	68079	0	0	NORDRE OSEN
	1						6400	68084	0	0	
	2						6392	68082	0	0	
	3						6392	68071	0	0	
	4						6386	68073	0	0	
	5						6383	68072	0	0	
	5,2						6384	68075	0	0	
GSS960119OGS01	0	UKJENT	AD	F	2	32v	6070	68194	0	0	KOPPANG
	1						6078	68195	0	2	
	2						6078	68203	0	1	
	3						6075	68210	0	0	
	4						6080	68216	0	0	
	5						6080	68227	1	1	
	5,5						6085	68229	0	1	
GSS960120JO01	0	UKJENT			1	32v	6559	67877	0	0	SØRE OSEN
	1						6555	67880	0	0	
	2						6555	67875	0	0	
GSS960123JO/MD0	0	UKJENT			1	32v	6528	67999	0	0	JORDET
	1						6535	67992	2	0	
	1,5						6537	67987	0	0	
GSS960123MD01	0	UKJENT			1	32v	6387	67870	0	0	JULUSSA
	1						6382	67879	2	0	
	2						6381	67882	4	0	
	3						6373	67876	4	0	
	4						6364	67879	2	0	
	4,4						6361	67879	0	0	
GSS960128JO01	0	UKJENT			1	32v	6538	67814	0	0	SØRE OSEN
	1						6537	67818	0	0	
	2						6539	67824	0	0	
	3						6543	67820	0	0	
	4						6533	67824	0	0	
	0					32v	6500	67843	0	0	JULUSSA
	1						6492	67850	0	0	
	0						6384	67853	0	0	
	1						6385	67866	0	0	
	2						6387	67858	0	0	

GSS960128TU01	0	?	AD	F	2	32v	6232	68179	0	0	EVENSTAD
	1						6241	68184	0	0	
GSS960128LG01	0	UKJENT			1	32v	6266	67766	0	0	RENA
	1						6260	67760	0	0	
	2						6265	67761	0	0	
	3						6272	67766	0	0	
GSS960128OGS01	0	UKJENT			1	33v	3556	68989	0	0	TRYSIL
	1						3555	68977	0	0	
	2						3560	68969	1	0	
	2,7						3567	68964	0	0	
GSS960201EN01	0	INGRID	1,5	F	1	32v	6259	67740	0	0	RENA
	1						6258	67744	0	0	
	2						6248	67746	0	0	
	3						6237	67747	0	0	
	4						6228	67750	0	0	
	5						6220	67752	0	0	
GSS960202EN01	0	INGRID	1,5	F	1	32v	6250	67840	0	0	RENA
	1						6248	67848	0	0	
	2						6245	67854	0	0	
	3						6238	67849	0	0	
	4						6239	67847	0	0	
	5						6238	67845	0	0	
	6						6245	67844	0	0	
	7						6253	67835	0	1	
GSS960203EM01	0	"Våler"	AD	M	1	32v	6557	67395	0	0	KYNNA
	1						6559	67396	0	0	
	2						6562	67406	2	0	
	3						6563	67416	0	0	
	4						6561	67419	3	0	
GSS960203EN02	0	UKJENT			1	32v	6244	67814	0	0	RENA
	1						6250	67819	0	0	
	2						6258	67825	0	0	
	3						6268	67829	0	0	
	4						6267	67838	0	0	
GSS960204MD01	0	"Våler"	AD	M	1	32V	6576	67380	0	0	FLISA
	1						6573	67370	0	0	
	2						6572	67358	2	1	
	3						6565	67355	1	0	
	4						6566	67352	0	0	
	5						6568	67343	0	0	
	6						6565	67337	0	0	
GSS960204JTR01	0	"Våler"	AD	M	1	32v	6515	67498	0	0	ELVERUM
	1						6521	67488	2	0	
	2						6528	67482	1	0	
	3						6533	67473	0	0	
	4						6538	67471	2	0	
	5						6540	67466	3	1	
	5,5						6543	67460	0	0	
GSS960205JTR01	0	"Våler"	AD	M	1	32v	6543	67460	0	0	ELVERUM
	1						6547	67456	0	0	KYNNA
	2						6556	67456	2	0	
	3						6562	67450	1	0	
	4						6565	67441	0	0	
	5						6566	67433	1	0	
	6						6561	67423	1	0	
	6,2						6561	67421	0	0	
GSS960205JO01	0	UKJENT			1	33v	3435	68125	0	0	JORDET
	1						3437	68121	1	0	
	2						3443	68123	0	0	
GSS960206JO01	0						3443	68123	0	0	
	1						3451	68122	0	0	
	2						3459	68122	0	0	
	3						3468	68119	0	0	
	3,8						3476	68124	0	0	

GSS960206XX01	0	?	AD	F	2	32v	6065	68165	0	0	MYKLEBYSJØEN
	1						6069	68174	1	0	
	2						6076	68178	0	0	
	2,5						6078	68183	0	0	
GSS960207EN01	0	UKJENT			1	32v	6272	67765	0	0	RENA
	1						6272	67774	0	0	
	2						6271	67781	0	0	
	3						6266	67785	0	0	
GSS960208JTR01	0						6266	67785	0	0	
	1						6265	67776	1	1	
	2						6266	67765	1	1	
	3						6271	67763	1	0	
GSS960213LG01	0	UKJENT			1	32v	6285	67743	0	0	RENA
	1						6284	67748	2	1	
	1,5						6284	67754	0	0	
	0						6285	67776	0	0	
	1						6285	67786	0	0	
	2						6286	67794	0	0	
GSS960213JTR01	0	UKJENT			1	32v	6284	67754	0	0	RENA
	1						6285	67765	0	1	
GSS960213EN01	0	UKJENT			1	32v	6284	67777	0	0	RENA
	1						6286	67786	0	0	
	2						6286	67797	2	0	
	3						6291	67806	1	0	
	4						6295	67813	0	0	
	5						6320	67826	0	0	
	6						6334	67824	0	0	
GSS960213MD01	0	UKJENT			1	32v	6562	67915	0	0	SØRE OSEN
	1						6565	67920	0	0	
	2						6564	67928	0	0	
	3						6558	67937	3	0	
	3,4						6557	67940	0	0	
GSS960215EM01	0	UKJENT			1	32v	6567	67420	0	0	FLISA
	1						6564	67429	0	0	
	2						6559	67438	0	0	KYNNA
	3						6555	67445	0	0	
	4						6550	67452	0	0	
	5						6550	67464	0	0	
	0						6471	67526	0	0	ELVERUM
	1						6478	67526	0	0	
	0						6528	67488	0	0	
	1						6533	67482	0	0	
	0						6525	67470	0	0	
	1						6518	67461	0	0	
	2						6516	67454	0	0	
	3						6512	67446	0	0	
	0						6492	67437	0	0	
	1						6494	67428	0	0	
	2						6499	67430	0	0	
	0						6483	67450	0	0	
	1						6483	67458	0	0	
	2						6482	67460	0	0	
	3						6485	67456	0	0	
	4						6495	67455	0	0	
	5						6504	67451	0	0	
	6						6510	67448	0	0	
	7						6511	67439	2	0	
	0						6520	67435	0	0	
	1						6514	67428	0	0	
	2						6514	67423	0	0	
	0						6509	67418	0	0	
	1						6499	67416	0	0	
	2						6493	67410	0	0	
	3						6486	67405	0	0	

	4						6484	67397	0	0	
	5						6476	67393	0	0	
	0						6473	67387	0	0	
	1						6478	67380	0	0	
	2						6487	67368	0	0	
GSS960215JO01	0	ASLAK	AD	M	1	32v	6564	67865	0	0	SØRE OSEN
	1						6566	67857	0	0	
	0						6613	67787	0	0	
	1						6618	67787	0	0	
	0					33v	3431	67811	0	0	
	1						3435	67815	0	0	
	2						3430	67817	0	0	
	0						3424	67821	0	0	
	1						3429	67815	0	0	
	2						3428	67815	0	0	
	3						3428	67825	0	0	
	0						3425	67825	0	0	
	1						3423	67832	0	0	
	2						3425	67834	0	0	
	0						3433	67838	0	0	
	1						3430	67835	0	0	
	2						3425	67834	0	0	
	3						3426	67840	0	0	
	4						3425	67843	0	0	
	5						3423	67856	0	0	
	0						3409	67940	0	0	JORDET
	1						3404	67948	0	0	
	2						3410	67947	0	0	
	3						3406	67945	0	0	
	4						3399	67951	0	0	
	5						3393	67960	0	0	
	6					32v	6603	67970	0	0	
	7						6601	67979	0	0	
	0						6600	68004	0	0	
	1						6600	68014	0	0	
	2						6601	68024	0	0	
	3						6603	68031	0	0	
GSS960215TU01	0	UKJENT			1	32v	6341	67923	0	0	JULUSSA
	1						6340	67914	0	0	
	2						6341	67905	1	0	
	3						6338	67897	0	0	
GSS960216JTR01	0						6337	67892	0	0	
	1						6341	67885	0	0	
	2						6344	67892	1	1	
	3						6350	67900	2	0	
	4						6359	67904	1	0	
	5						6368	67906	1	0	
GSS960216TU01	0	UKJENT			1	32v	6415	67900	0	0	JULUSSA
	1						6423	67908	0	0	
	2						6429	67914	0	1	
	3						6433	67922	0	0	
GSS960216MD01	0	UKJENT			1	32v	6482	67965	0	0	NORDRE OSEN
	1						6478	67965	0	0	
	2						6462	67969	0	0	
	3						6471	67964	0	0	
	4						6473	67970	0	0	
	5						6476	67975	0	0	
	6						6475	67981	0	1	
	7						6473	67979	0	0	
	8						6463	67978	0	1	
	9						6456	67972	1	0	
GSS960218JTR01	0	Bøygen	AD	M	1	32v	6296	67811	0	0	RENA
	1						6299	67808	5	1	
	2						6304	67801	0	1	

	3						6306	67792	1	0	
	4						6305	67781	0	0	
	5						6314	67784	0	0	
	5,2						6313	67786	0	0	
GSS960218LG01	0	UKJENT			1	32v	6429	67625	0	0	ELVERUM
	1						6426	67636	0	0	
	2						6423	67639	0	1	
GSS960218MD01	0	UKJENT			1	32v	6561	67911	0	0	RENA
	1						6558	67920	9	1	
	2						6559	67928	5	0	
	3						6556	67939	0	0	
	4						6548	67945	2	0	JORDET
	5						6544	67954	7	0	
GSS960220MD01	0	UKJENT			1	32v	6595	67965	0	0	JORDET
	1						6603	67962	2	0	
	2					33v	3394	67955	2	0	
	3						3402	67949	1	0	
	4						3408	67949	0	0	
	5						3409	67945	0	0	
	6						3416	67947	0	0	
	7						3425	67948	0	0	
	8						3431	67939	0	0	SØRE OSEN
	8,6						3434	67935	0	0	
	0						3467	67853	0	0	
	1						3474	67852	0	0	
	2						3485	67856	0	0	
	3						3492	67865	0	0	
	3,7						3495	67870	0	0	
GSS960220JTR01	0	UKJENT			1	32v	6428	68056	0	0	NORDRE OSEN
	1						6437	68060	0	0	
	2						6446	68065	1	0	
	3						6452	68072	0	0	
	4						6460	68080	0	0	
	5						6465	68080	0	0	
	6						6467	68087	1	1	
	7						6476	68094	0	0	
	8						6484	68098	0	0	
	9						6488	68103	2	0	
	10						6491	68111	0	0	
	11						6496	68120	0	0	
	12						6501	68130	0	0	
	13						6507	68137	0	0	
	14						6511	68147	0	0	
GSS960221LG01	0	UKJENT			1	32v	6318	67946	0	0	EVENSTAD
	0,4						6321	67949	0	0	
	0						6331	67948	0	0	NORDRE OSEN
	1						6339	67948	3	1	
	1,6						6343	67952	2	0	
GSS960222JTR01	0	?	AD	F	2	32v	6073	68179	0	0	MYKLEBYSJØEN
	1						6077	68172	2	1	
	2						6074	68165	4	0	
	3						6064	68168	2	0	
	4						6057	68162	2	0	
	5						6055	68154	2	2	
	6						6056	68144	0	0	
	7						6060	68137	0	5	
	8						6065	68132	0	0	
	8,9						6064	68137	0	0	
GSS960223JO01	0	UKJENT			1	32v	6527	67975	0	0	TRYSIL
	1						6530	67981	0	0	
	2						6534	67981	3	1	
	3						6526	67983	0	0	
	4						6532	67986	0	0	
	5						6534	67984	0	0	

	6						6526	67984	0	0	
	7						6526	67992	0	0	
	7,7						6525	67999	0	0	
GSS960301JTR01	0	INGRID	1 3/4	F	1	32v	6342	67599	0	0	ELVERUM
	1						6338	67606	1	0	
	2						6333	67616	2	0	LØTEN
	3						6327	67617	1	0	
GSS960301JTR02	0	?	AD	F	3	32v	6327	67617	0	0	LØTEN
	1						6329	67629	0	1	
	2						6322	67629	1	0	
	3						6314	67635	0	0	
	4						6307	67640	1	0	
	5						6301	67650	2	0	
	6						6298	67658	1	0	RENA
	7						6292	67667	1	0	
	8						6286	67676	0	0	
GSS960301LG01	0	?	AD	F	2	32v	6043	68167	0	0	MYKLEBYSJØEN
	1						6037	68171	1	2	
	2						6031	68177	3	3	
	3						6031	68186	0	0	
	4						6023	68196	0	0	
GSS960302MD01	0	UKJENT			1	32v	6575	68040	0	0	JORDET
	1						6579	68044	0	0	
	2						6582	68038	0	0	
	3						6588	68034	0	1	
	4						6596	68030	0	0	
	4,6						6598	68025	0	0	
GSS960302TU01	0	UKJENT			1	32v	6314	68003	0	0	EVENSTAD
	1						6320	68005	0	0	
	2						6308	68002	0	0	
	3						6301	68000	0	0	
	4						6292	67999	2	0	
	5						6284	68007	1	0	
GSS960304MD01	0	UKJENT			1	33v	3392	67965	0	0	JORDET
	1						3392	67958	0	0	
	2						3400	67950	0	0	
	3						3405	67946	0	0	
	4						3410	67943	0	0	
	5						3405	67949	0	0	
	6						3402	67957	0	1	
	7						3407	67948	3	0	
	8						3409	67946	0	0	
	9						3401	67951	0	0	
	10						3396	67959	0	1	
GSS960305JTR01	0	INGRID	1 3/4	F	1	32v	6328	67631	0	0	LØTEN
	1						6320	67637	0	0	
	2						6319	67646	0	0	
	3						6326	67652	0	0	
	4						6332	67659	0	0	RENA
	5						6330	67666	0	0	
	6						6325	67668	0	1	
	7						6331	67674	0	0	
	8						6330	67682	0	2	
	9						6340	67687	0	1	JULUSSA
	10						6346	67692	0	0	
	11						6351	67698	0	0	
	12						6356	67708	0	0	
	13						6360	67719	0	0	
	14						6364	67727	0	0	
	15						6371	67735	0	1	
	16						6376	67735	0	0	
	17						6382	67741	0	0	
	18						6378	67748	0	0	
	19						6373	67759	0	0	

	20						6366	67767	0	0	
	20,9						6357	67768	0	0	
GSS960305ES01	0	UKJENT			1	32v	6270	68065	0	0	EVENSTAD
	1						6279	68066	0	0	
	2						6283	68068	0	0	
	3						6286	68076	0	0	
GSS960305EM01	0	UKJENT			1	32v	6268	68113	0	0	EVENSTAD
	1						6260	68112	2	0	
	2						6255	68120	3	0	
	2,5						6253	68123	0	0	
GSS960305JPW01	0	UKJENT			1	32v	6254	68125	0	0	EVENSTAD
	1						6259	68131	0	0	
	2						6255	68140	0	1	
	3						6248	68144	0	0	
	3,7						6242	68145	0	0	
GSS960313TB01	0	UKJENT			1	33v	3519	68192	0	0	TRYSIL
	1						3521	68185	0	0	
	2						3520	68173	0	0	
	3						3519	68162	0	0	
	4						3521	68154	0	0	
	5						3523	68145	1	0	
	6						3530	68137	0	0	
	7						3530	68130	0	0	
	8						3535	68119	0	0	
GSS960318LG01	0	UKJENT			1	32v	6522	68014	0	0	JORDET
	1						6530	68020	0	0	
	2						6539	68025	0	0	
	3						6549	68029	0	0	
	4						6556	68036	0	0	
	5						6562	68043	0	0	
	6						6573	68041	0	0	
	7						6581	68040	0	0	
	7,9						6583	68043	0	0	
GSS960318TU01	0	PEER	AD	M	1	32v	6106	68248	0	0	KOPPANG
	1						6102	68256	6	0	Parring + fam.gr?
	2						6101	68251	2	0	
	2,7						6102	68249	2	0	
GSS960319ES01	0	BØYGEN	AD	M	1	32v	6106	67250	0	0	RENA
	1						6100	67251	1	0	
GSS960319TU01	0	PEER	AD	M	3	32v	6099	68190	0	0	MYKLEBYSJØEN
	1						6089	68190	0	0	
	1,9						6082	68192	0	0	
GSS960321JTR01	0	UKJENT			1	32v	6327	67911	0	0	JULUSSA
	1						6334	67909	0	0	
	2						6341	67916	0	0	
	3						6345	67923	1	0	
GSS960321TB01	0	ASLAK	AD	M	1	32v	6575	67971	0	0	TRYSIL
	1						6573	67961	3	0	
	2						6574	67952	4	2	
	3						6572	67956	0	0	
	0						6571	67957	0	0	
	1						6576	67949	0	0	
	2						6578	67951	0	0	
	3						6571	67959	0	0	
	0						6565	67965	0	0	
	1						6564	67970	0	0	
GSS960321LG01	0	HELGA	AD	F	3	32v	6278	67756	0	0	RENA
	1						6288	67759	0	1	
	2						6285	67761	0	2	
	2,5						6284	67756	0	1	
GSS960324JTR01	0	HELGA?	AD	F	2	32v	6277	67752	0	0	RENA
	1						6266	67750	0	0	
	1,7						6260	67747	1	0	
GSS960325JTR01	0	BØYGEN	AD	M	2?	32v	6376	67802	0	0	JULUSSA

	1						6386	67799	1	0	
	2						6378	67794	1	1	
	2,7						6370	67793	1	0	
GSS960326JTR01	0	INGRID	1,3/4	F	1	32v	6209	68010	0	0	EVENSTAD
	1						6212	68015	1	0	
GSS960328AR01	0	UKJENT			1	32v	6355	67941	0	0	NORDRE OSEN
	1						6349	67946	0	0	
	2						6343	67952	0	0	
	2,5						6343	67956	0	0	
GSS960328EM01	0	HELGA	AD	F	2	32v	6158	67512	0	0	LØTEN
	1						6159	67508	0	0	
	2						6160	67505	0	0	
	2,3						6160	67500	0	0	
GSS960402EN01	0	BØYGEN	AD	M	2	32v	6290	67741	0	0	RENA
	1						6285	67735	0	0	
	2						6284	67736	0	0	
	3						6287	67726	0	0	
	4						6288	67719	0	0	
	5						6285	67715	0	0	
GSS961116JO01	0	INGRID	2	F	1	32v	6239	67801	0	0	RENA
	1						6236	67800	0	0	
	2						6237	67791	0	0	
	3						6239	67781	0	0	
GSS961120TU01	0	NORA	AD	F	1	32v	6319	67995	0	0	EVENSTAD
	1						6313	67995	0	0	
	2						6310	67997	0	0	
	2,2						6312	67999	0	0	
GSS961122LG01	0	GYDA	AD	F	2	32v	6312	67826	0	1	RENA
	1						6305	67822	0	1	
	2						6300	67815	0	0	
	3						6295	67810	0	0	
	4						6296	67804	0	0	
	5						6293	67807	0	0	
	6						6297	67808	1	0	
	7						6291	67809	2	0	
	8						6295	67813	1	0	
	9						6297	67810	2	0	
	10						6300	67816	2	0	
	11						6305	67823	1	0	
	12						6312	67827	1	0	
	13						6304	67821	0	0	
GSS961127JO01	0	GYDA	AD	F	2	32v	6306	67821	0	0	RENA
	1						6317	67819	0	0	
	2						6326	67819	0	0	
	3						6334	67816	1	0	JULUSSA
	4						6342	67816	0	0	
	5						6348	67818	0	0	
	6						6356	67814	0	0	
	7						6362	67812	0	0	
	8						6371	67815	0	0	
	9						6380	67814	1	0	
GSS961127LG01	0	UKJENT			1	32v	6294	67810	0	0	RENA
	1						6291	67802	4	1	
	2						6286	67795	0	0	
	3						6286	67786	1	0	
	4						6286	67776	1	0	
	5						6286	67769	5	0	
	6						6284	67758	6	0	
	7						6284	67756	2	0	
	8						6290	67754	0	0	
	9						6287	67747	1	0	
	10						6286	67738	1	0	
	11						6287	67727	0	0	
	12						6291	67722	0	0	

	13						6285	67712	0	0	
	14						6287	67703	1	1	
	15						6292	67694	0	0	
	16						6300	67699	0	0	
	17						6306	67702	0	0	
GSS961210JO01	0	NORA	AD	F	1	32v	6551	67898	0	0	SØRE OSEN
	1						6551	67888	0	0	
	2						6550	67884	0	2	
GSS961214JO01	0	ODA	AD	F	3	32v	6506	67976	0	0	NORDRE OSEN
	1						6506	67967	0	0	
	2						6512	67972	0	0	
	3						6514	67964	1	0	
	4						6520	67960	3	0	
	5						6520	67958	0	0	
	6						6525	67951	0	0	
	7						6527	67945	0	0	JORDET
	8						6535	67937	0	0	SØRE OSEN
	9						6540	67943	0	0	JORDET
	10						6544	67944	0	0	
GSS961216TU01	0	UKJENT			1	32v	6450	67633	1	0	ELVERUM
	1						6445	67627	0	0	
	2						6439	67626	0	0	
	3						6435	67630	0	0	
	4						6429	67631	0	0	
	5						6433	67630	0	0	
	6						6438	67627	0	0	
	7						6442	67631	0	0	
	8						6446	67634	0	0	
	8,5						6450	67633	0	0	
GSS961219LG01	0	ODA	AD	F	3	32v	6596	67964	0	0	JORDET
	1						6607	67964	0	0	
	2					33v	3396	67958	0	0	
	3						3400	67954	0	0	
	4						3408	67948	0	0	

ControlNr	kmid	IDLynx	AGE	SEX	LY_NR	zone	x	y	urine	faeces	map
GSS970108LG01	0	NORA	AD	F	3	32v	645500	6791900	0	0	JULUSSA
	1						645900	6792700	1	1	
	0						646600	6793400	0	0	
	1						647100	6792500	0	0	
GSS970108LR01	0	NORA	AD	F	3	32v	651300	6790100	0	0	JULUSSA
	1						652000	6789800	1	1	
	2						651700	6789600	1	2	
	3						652300	6789600	0	0	
GSS970109LR01	0	BØYGEN	AD	M	1	32v	644600	6762400	0	0	ELVERUM
	1						645500	6762800	2	0	
	2						646200	6763300	0	0	
	2,9						646600	6762700	0	0	
GSS970116JO01	0	HEDDA?	AD	F	3	32v	612400	6751100	0	0	RENDALEN
	1						612500	6750500	2	0	
	2						612500	6750700	0	0	
	3						612500	6750500	0	2	
GSS970117LR01	0	BØYGEN	AD	M	1	32v	645300	6742900	0	0	ELVERUM
	1						645700	6742300	0	1	
GSS970126EN01	0	HEDDA	AD	F	3	32v	625400	6714400	0	0	EVENSTAD
	1						625500	6713200	0	0	
GSS970128HH01	0	?	AD	F	3	32v	659100	6782800	0	0	SØRE OSEN
	1						659500	6782200	0	0	
	2						659900	6781800	0	0	
	0						660700	6779700	0	0	
	1						661500	6779500	0	1	
	2						661700	6779700	0	0	
	3						661100	6779300	0	0	
GSS970203HH01	0	NORA	AD	F	3	32v	637000	6793900	0	0	NORDRE OSEN
	1						636900	6793600	0	0	
	2						636200	6793400	0	1	
	0						638000	6791800	0	2	JULUSSA
	1						638100	6792400	0	0	
	2						637700	6793000	0	0	
	3						637400	6793200	0	0	
GSS970205JO01	0	GYDA	AD	F	2	32v	634500	6768600	0	0	JULUSSA
	1						633700	6768000	0	1	
	2						632800	6767500	9	0	JULUSSA/RENA
	3						632100	6767800	0	1	RENA
GSS970212HH01	0	HEDDA	AD	F	3	32v	610500	6873600	0	0	RENDALEN
	1						610800	6873700	0	1	
	2						610800	6874000	0	0	
	3						610600	6874600	0	0	
	4						610100	6874900	0	0	
	5						610500	6875400	0	0	
	6						610900	6875400	0	3	
	7						611000	6874800	0	0	
	8						610900	6874300	0	0	
	9						610500	6874000	0	0	
GSS970221EN01	0	MOR ÅSE	AD	F	3	32v	657600	6739400	0	0	
	1						657800	6739800	0	0	
GSS970225HH01	0	GYDA	AD	F	2	32v	646600	6765000	0	0	ELVERUM
	1						646100	6765900	0	0	JULUSSA
	2						643600	6765300	1	0	ELVERUM
	3						644500	6764800	0	0	
	4						643500	6764500	0	0	
	5						643000	6763600	0	0	
	6						642800	6762900	0	0	
	6,5						642800	6762400	0	0	
GSS971218HR01	0	ODIN	AD	M	1	32v	634500	6794300	0	0	NORDRE OSEN
	1						634000	6794700	9	0	
	2						633200	6794400	6	0	
	3						633200	6794700	4	1	
	3,6						633400	6793100	0	0	

ControlNr	kmid	IDLynx	AGE	SEX	LY_NR	zone	x	y	urine	faeces	map
GSS980119LØ01	0	GYDA	AD	F	3	32v	6286	67759	0	0	RENA
	1						6295	67752	0	0	
	0						6295	67714	0	0	
	1						6302	67709	1	0	
	2						6306	67699	1	2	
	3						6314	67696	0	0	
	4						6320	67689	0	0	
	5						6328	67681	2	0	
	6						6330	67675	1	0	
	7						6331	67666	0	0	
	0						6354	67626	0	0	ELVERUM
	1						6355	67621	4	2	
	2						6358	67614	0	0	
	2,7						6362	67609	0	0	
GSS980126LØ01	0	ODIN	AD	M	1	32v	6319	68010	0	0	EVENSTAD
	1						6325	68003	4	1	NORDRE OSEN
	2						6333	67996	5	0	
	3						6336	67994	4	0	
	4						6337	67984	13	0	
	5						6341	67975	11	0	
	6						6343	67966	4	0	
	7						6344	67957	9	0	
	8						6350	67952	9	0	
	9						6354	67943	7	0	
	10						6361	67936	5	0	
	11						6365	67930	5	0	JULUSSA
	12						6359	67925	6	0	
	13						6353	67917	6	0	
	14						6347	67913	6	0	
	15						6347	67904	6	0	
	16						6344	67896	6	0	
	17						6342	67887	1	0	
	18						6343	67877	9	1	
	19						6337	67869	2	0	
	20						6336	67862	2	0	
	21						6333	67853	2	0	
	22						6330	67844	2	0	
	22,4						6328	67841	0	0	
	0						6321	67841	0	0	RENA
	1						6313	67836	3	0	
	2						6306	67833	5	0	
	3						6295	67837	3	0	
	4						6285	67833	4	0	
	5						6280	67836	3	0	
	6						6282	67845	4	0	
	7						6289	67852	4	0	
	8						6298	67859	5	0	
	0						6283	67880	0	0	
	1						6285	67886	6	0	
	2						6291	67896	3	0	
GSS980305JO01	0	ULLA	AD	F	2	32v	6506	67910	0	0	JULUSSA
	1						6505	67904	0	0	
	2						6515	67899	0	0	
	3						6522	67900	0	0	
	4						6523	67895	0	1	
	5						6526	67887	0	0	
	6						6528	67880	1	0	SØRE OSEN
	7						6536	67880	0	0	
GSS980307JO01	0	NORA	AD	F	3	32v	6497	67936	0	1	JULUSSA
	1						6495	67940	0	2	
	2						6494	67939	1	1	
	3						6488	67944	0	0	NORDRE OSEN
	4						6478	67948	0	0	

	4,7						6472	67954	0	0	
GSS980312HR01	0	TYRA	AD	F	2	?	6034	67450	0	0	HAMAR
	1						6031	67451	0	0	
	2						6027	67460	8	0	
	3						6034	67467	9	0	
	4						6030	67476	1	0	
	5						6025	67467	0	0	
	6						6026	67456	8	0	
	0						6030	67476	0	0	
	1						6023	67475	2	0	
	2						6014	67469	2	0	
	3						6007	67471	2	0	
	4						6008	67465	2	0	
	5						6002	67462	5	0	
	6						6996	67459	6	0	
	7						6989	67453	9	0	
	8						6983	67454	9	0	
	0						6017	67446	0	0	
	1						6008	67446	2	1	
	2						6000	67442	2	0	
	3						6995	67438	2	1	
	4						6994	67438	2	0	
	5						6982	67441	1	1	
	6						6988	67435	1	0	
	7						6981	67439	1	0	
	8						6973	67442	1	0	
	9						6966	67438	5	2	
	10						6956	67438	5	1	
GSS980316JO01	0	GYDA	AD	F	3	32v	6374	67825	0	0	JULUSSA
	1						6371	67816	0	0	
	2						6370	67810	2	1	
	3						6364	67809	3	0	
	4						6357	67804	1	0	
	5						6352	67807	0	0	
	6						6345	67812	0	0	
	7						6337	67817	0	0	
	8						6330	67821	0	0	
	9						6324	67821	0	0	RENA
	10						6317	67815	1	0	
	11						6306	67820	0	0	
	12						6297	67814	1	0	
	13						6292	67806	2	0	
	14						6298	67808	0	0	
	15						6308	67810	0	0	
	16						6315	67815	0	0	
	17						6317	67807	0	0	
	18						6314	67800	0	0	
	19						6307	67803	0	0	
	20						6312	67797	0	0	
	21						6309	67796	0	0	
	22						6315	67796	0	0	
	23						6322	67797	0	0	
	24						6326	67789	0	0	
	25						6326	67784	2	2	
	26						6329	67782	1	1	
	27						6328	67776	2	1	
	28						6326	67775	0	1	
	29						6324	67765	0	0	

APPENDIX II

Table 1. Dates when known lynx marked in the three different seasons in 1996. MW: midwinter, LW: late winter, EW: late winter.

Lynx	Sex	MW (Jan-Feb)	LW (March)	EW (Nov-Dec)
Peer	M		18.	
Aslak	M		21.	
Våler	M	3.-5. Feb		
Bøygen	M	18. Feb	19. and 25.	
Helga	F	15. Jan	24.	
Ingrid	F		1., 5. and 26.	
Nora	F			10. Dec
Gyda	F			22.-27. Nov
Oda	F			14. Dec

Table 2. Dates when known lynx marked in the three different seasons in 1997. There were no recorded markings in the late season, March.

Lynx	Sex	MW (Jan-Feb)	LW (March)	EW (Nov-Dec)
Bøygen	M	9. and 17. Jan		
Odin	M			18. Dec
Nora	F	8. Jan, 3. Feb		
Hedda	F	16. and 26. Jan, 12. Feb		
Gyda	F	5. and 25. Feb		

Table 3. Dates when known lynx marked in two different seasons in 1998. Last recorded field observation was made on the 16th of March on the female lynx Gyda.

Lynx	Sex	MW (Jan-Feb)	LW (March)
Odin	M	26. Jan	
Nora	F		7.
Gyda	F	19. Jan	16.
Ulla	F		5.
Tyra	F		12.

APPENDIX III

Summary from the field notes

Several of the lynx are seen placing marks along their border.

The male Aslak has an enormous home range, more than five times the size of Peer's, another resident male (figure 2). The 52, 7 km Aslak was tracked we can see that he only stayed in a minor part of the home range, close to Nora and Oda, to female adults, and also placed his markings here.

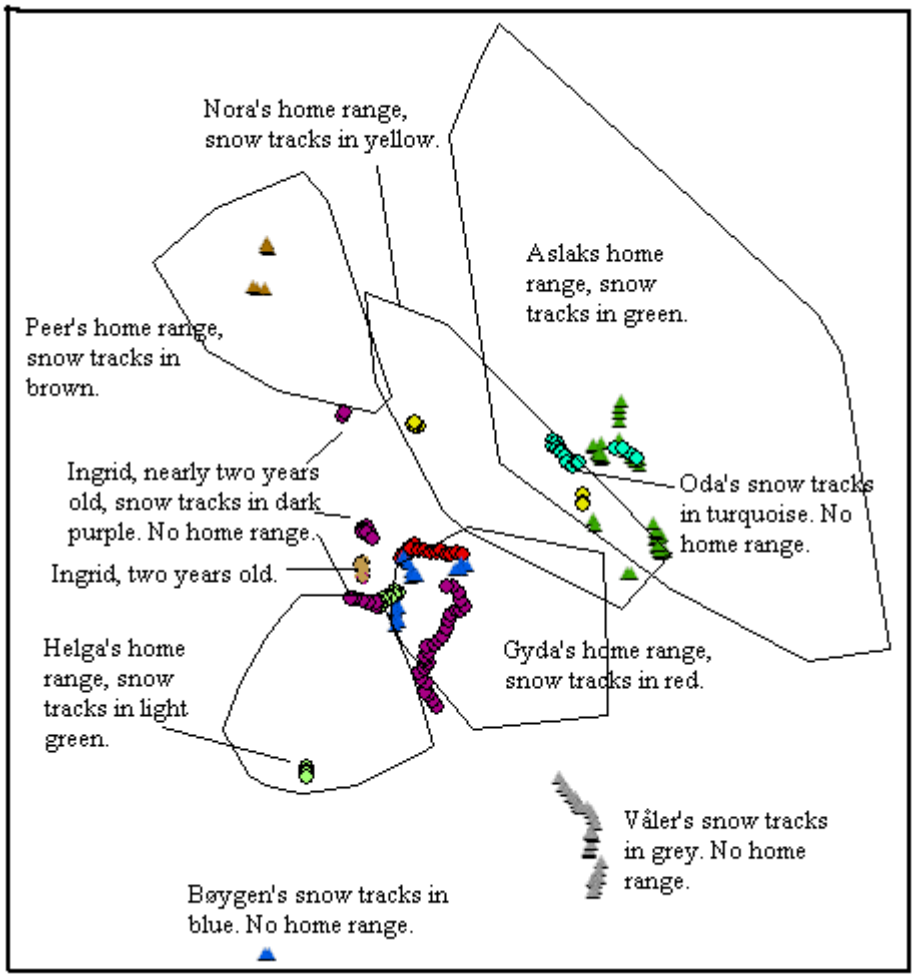

Figure 1. Home ranges and recorded snow tracks of known lynx in the year 1996.

Nora is recorded while placing markings near her border, not far from Oda's and Aslak's markings (figure 3).

According to Breitenmoser et.al (1993) juveniles are accepted in territories before they reach mature age (Ingrid in Gyda's territory).

Gyda's territory is the most scent marked home range in 1996 (figure 3). Gyda, Ingrid a 1.7 year old female, Bøygen and Helga are the tagged lynx that spent time here. Gyda scent marked near her border early November, after that there are no recorded snow tracks or scent marks of her in 1996.

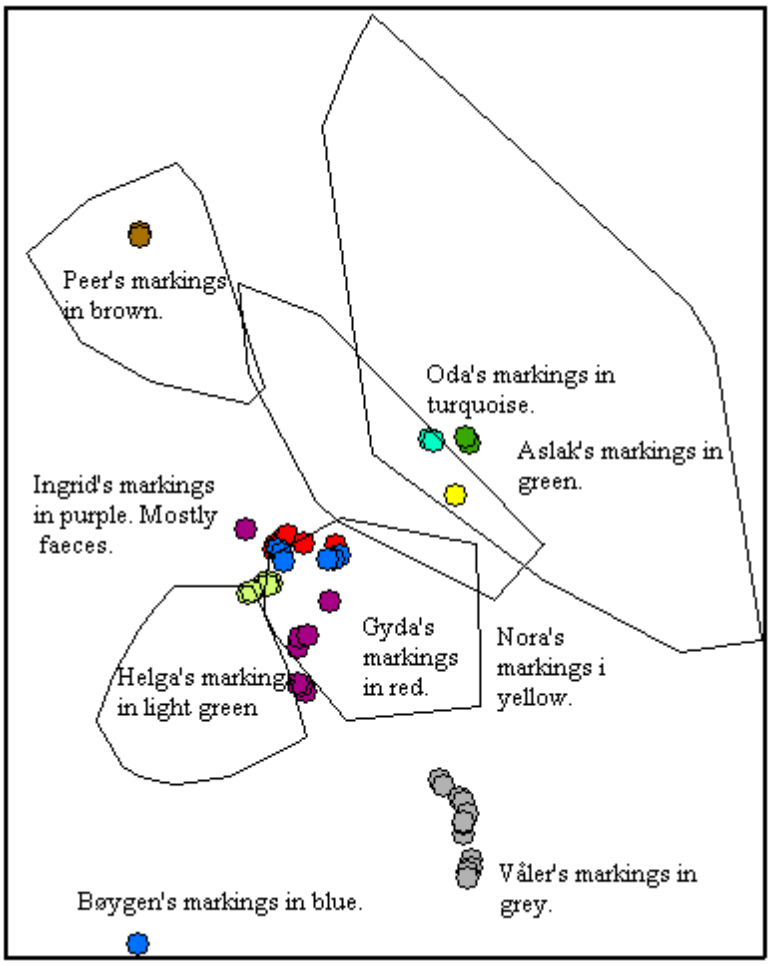

Figure 2. Scent marks made by known lynx in 1996.

Bøygen has placed his scent marks over Gyda's marks at two locations (figure 3).

Bøygen and Gyda are found placing scent marks on the borders of Bøygen's and in their shared territories in 1997 (figure 4).

Odin placed a large amount of markings near Gyda's border in 1998 (figure 5). On the same date he continues the considerable quantity of markings in his own and Nora's territory. Gyda's snow tracks in the same figure are from two different dates. Those near her border next to Odin's home range were made in March. Her tracks near the left border were made in January. In the neighbouring territory we find Ingrid (figure 6).

Female's home ranges overlap in a very little degree, they are sometimes seen trespassing to each other territories. All the females in figure 3, perhaps except for Nora, show tendencies to visit and scent mark in other female's territories.

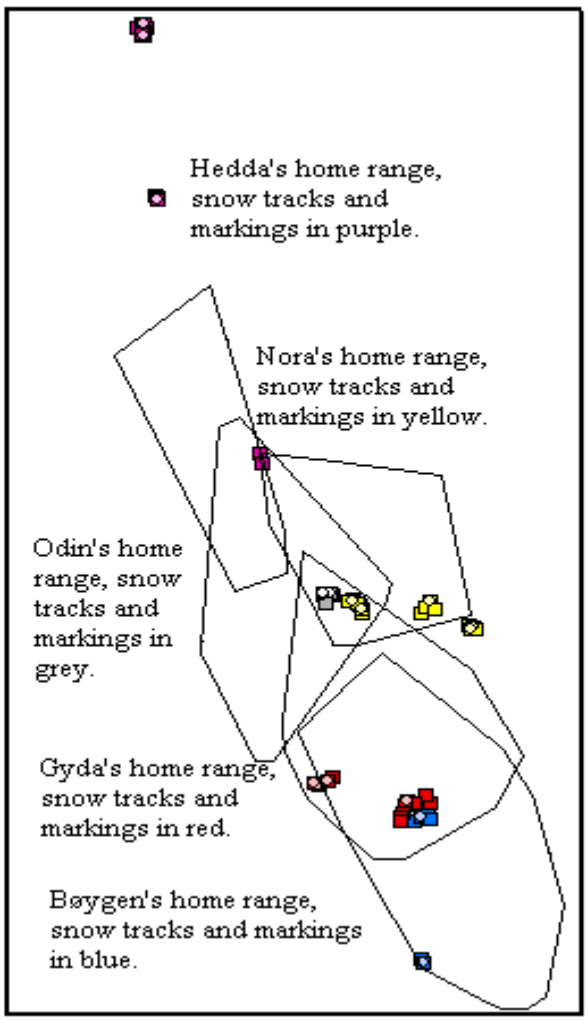

Figure 3. Home ranges, snow trackings and scent marks in known lynx 1997.

Overlapping in home ranges occurs to some degree near the borders, but this must be expected when calculating home ranges.

Placing scent marks when travelling through a defended area

Ingrid's markings in Gyda's territory indicate that she know she is trespassing into an area that is already occupied; she marks with faeces, left promptly in sight (figure 3).

Hedda, Nora and Ulla shows the same behaviour as Ingrid in placing scent marks when travelling outside their own territories (figure 4 and 5).

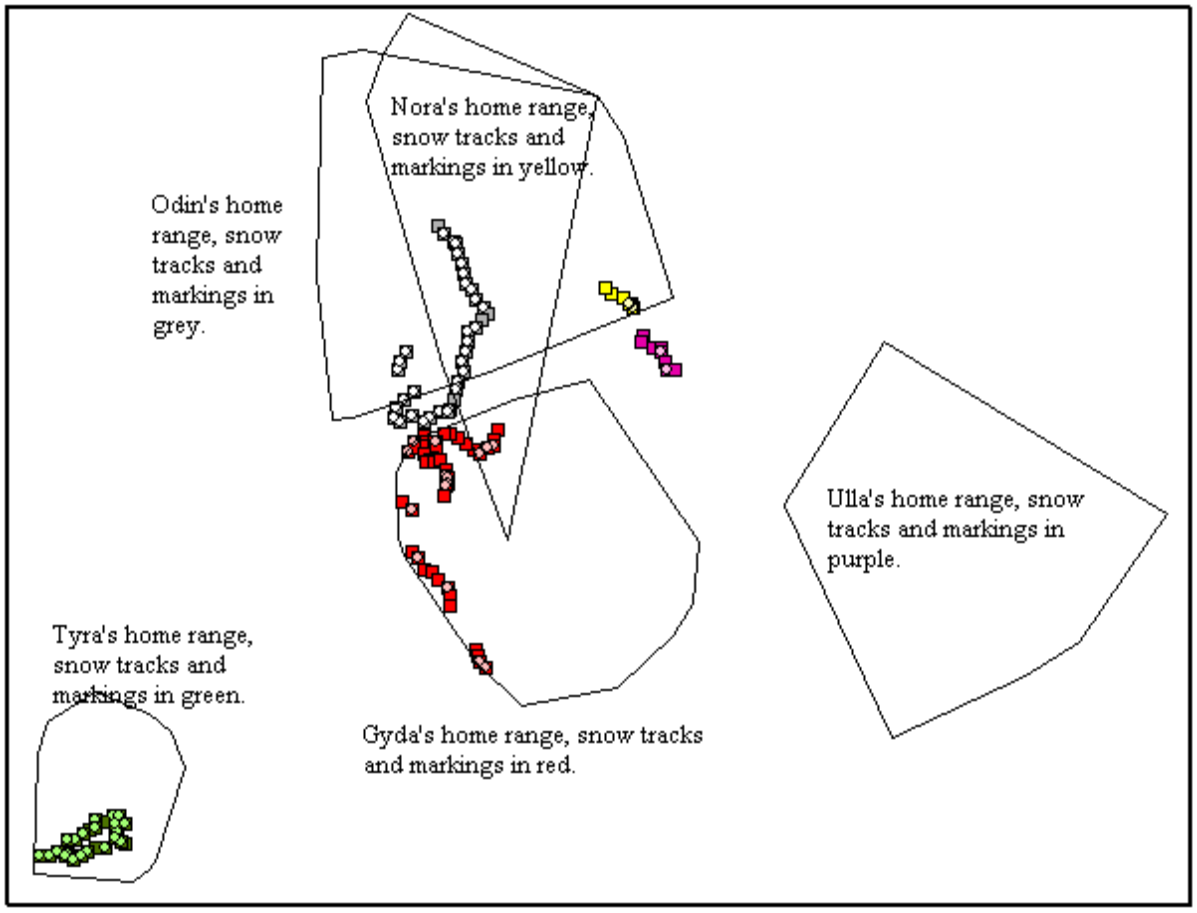

Figure 4. Home ranges, snow trackings and scent marks of known lynx in 1998.

Tyra had a visitor in her territory when snow tracks and scent marks was recorded, this was probably a male (figure 5). Males and females are found to leave scent marks in the other sex's territory during mating period. Normally the male visit the female.