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Photo: Alexander Kopatz



## Non-invasive genetic monitoring of the Pasvik-Inari-Pechenga brown bear population using systematic hair-trapping

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SVANHOVD • NORWAY

Pasvik  Inari  
Trilateral Park

# Non-invasive genetic sampling

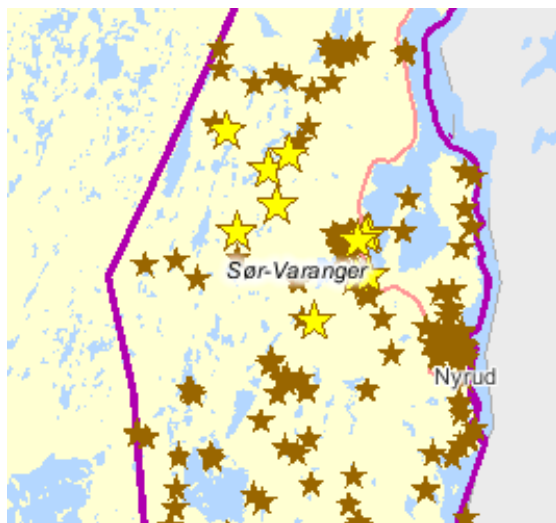
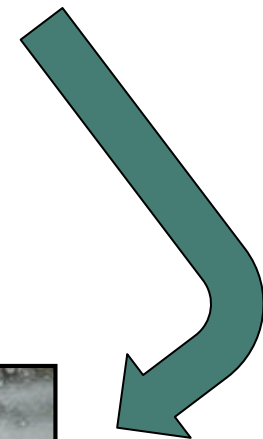


Photo: Sari Magga



Photo: Alexander Kopatz

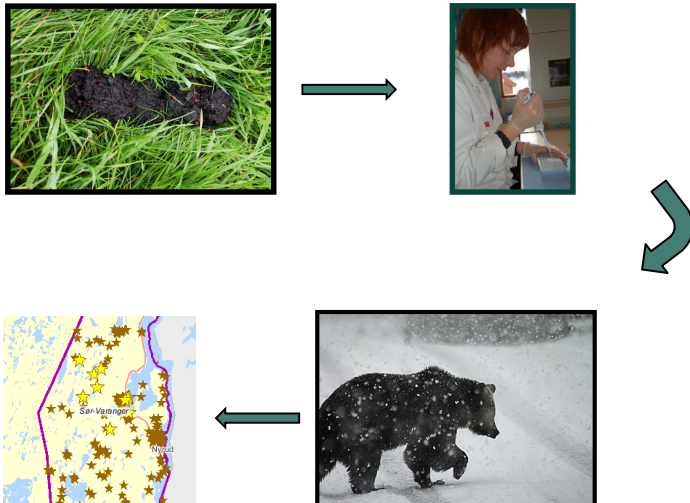
# Non-invasive genetic monitoring : The workflow



# Non-invasive Genetic Mark -Recapture

In Norway and Sweden, the brown bear population is monitored and estimated using non-invasive genetic methods

In Norway, non-invasive genetic monitoring is done nationwide every year.



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Populasjonsovervåking av brunbjørn

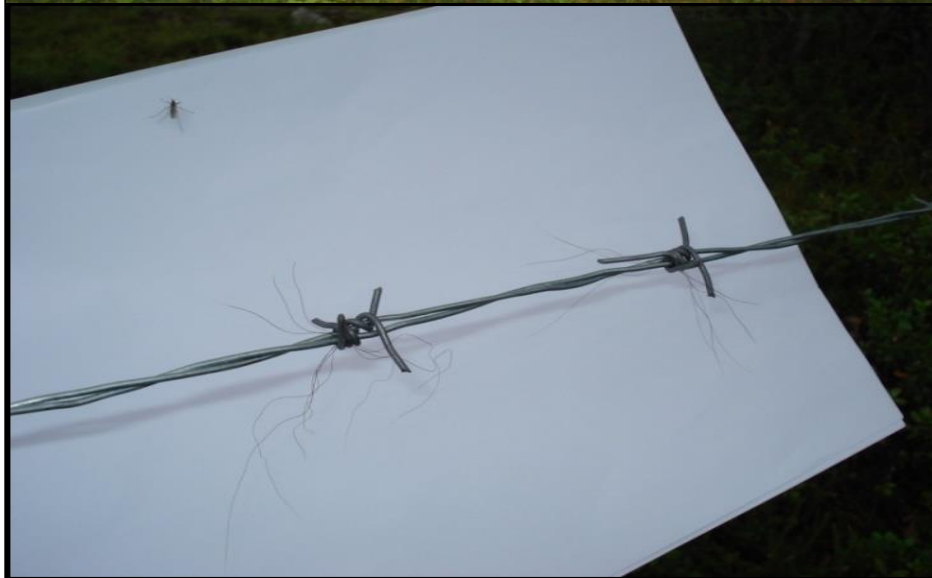
DNA-analyse av prøver innsamlet i Norge i 2018

Ida Fløystad  
Henrik Brøseth  
Beate Banken Bakke  
Hans Geir Eiken  
Snorre B. Hagen

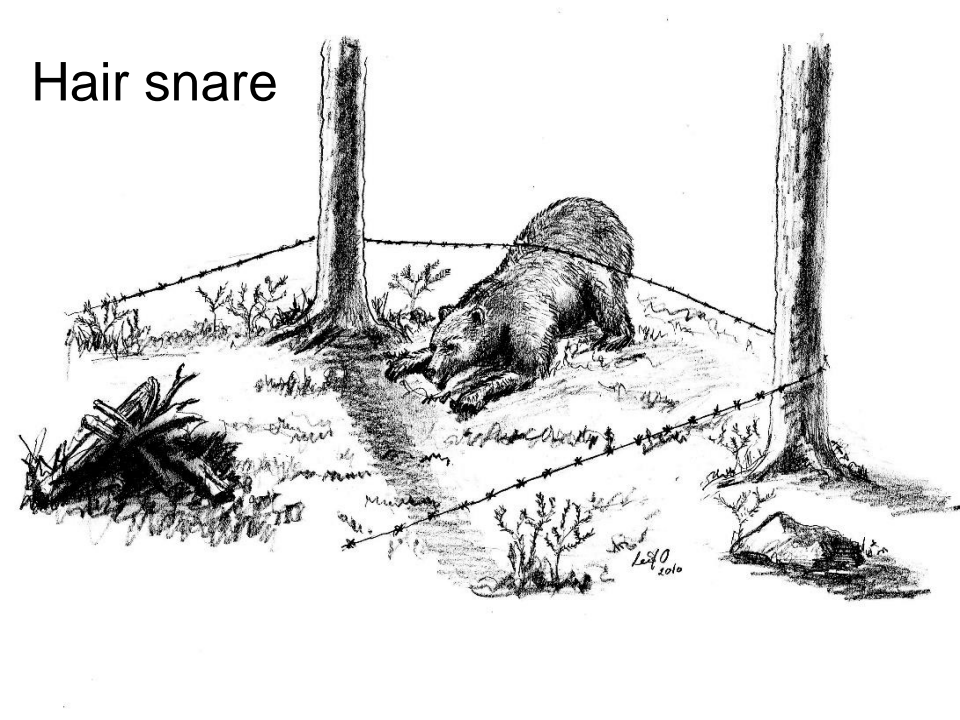
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# Hair snares



Hair snare



# Monitoring of the Pasvik-Inari-Pechenga brown bear population in 2015 using hair-trapping



Siv Grethe Aarnes<sup>1</sup>, Alexander Kopatz<sup>1</sup>, Hans Geir Eiken<sup>1</sup>, Julia Schregel<sup>1</sup>, Paul E. Aspholm<sup>1</sup>, Tuomo Ollila<sup>2</sup>, Olga Makarova<sup>3</sup>, Natalia Polikarpova<sup>3</sup>, Vladimir Chizhov<sup>3</sup>, Sergey Ogurtsov<sup>3</sup> and Snorre B. Hagen<sup>1</sup>

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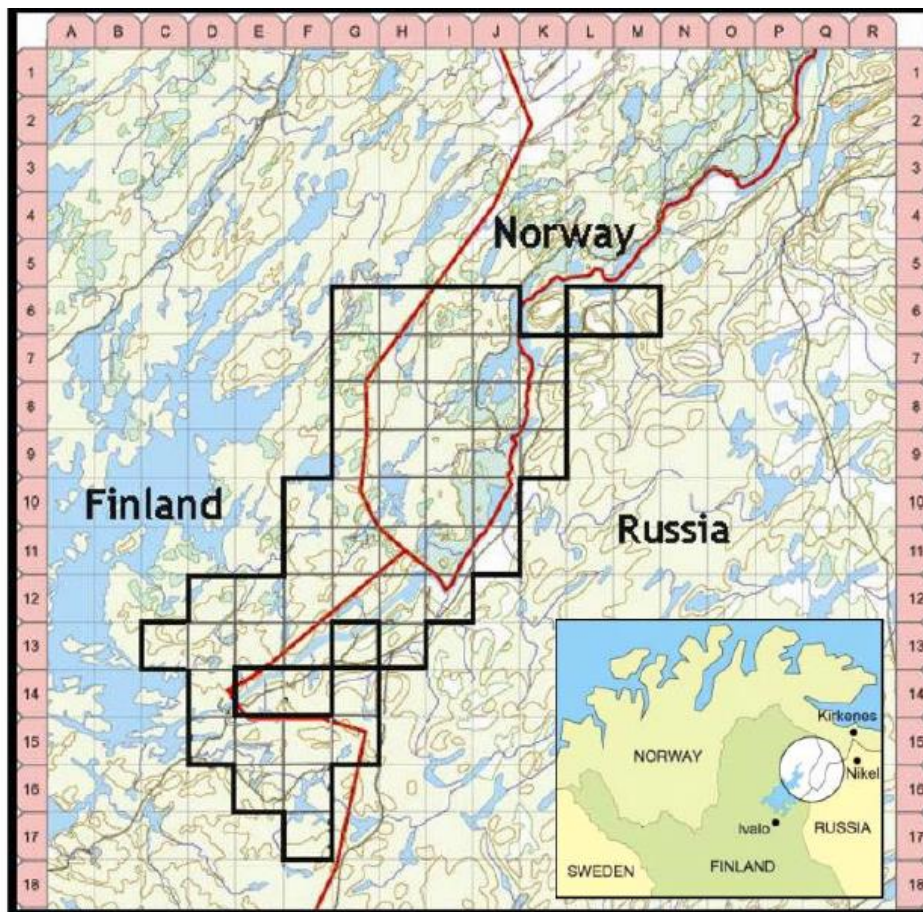
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# Study area and schedule 2015



Day 1	Set-up	scent lure
Day 14	1st check	scent lure
Day 28	2nd check	translocation/scent lure
Day 42	1st check	scent lure
Day 70	2nd check	removal

**Figure 1:** Study area in the trans-border area around Pasvik and the Øvre Pasvik National park in Norway (Sør-Varanger) including areas in Finland (Inari) and Russia (Pechenga). The study area was divided in 53 squares a 5 km x 5 km with one hair-trap in each (grid square nr. G6, G7 and G8 were excluded in 2015). Hair-traps were moved to a second location within the same square half-way through the collection period (after four weeks). The squares in the grid are marked from C13 in the west to M6 in the east.



# Results 2015

209 hair samples

DNA in 158 of 209 hair samples

Complete DNA-profile and identity for 136 samples (65%)

26 different brown bears, 17 females and 9 males

13 of 26 brown bears were previously unknown

Pasvik  Inari  
Trilateral Park

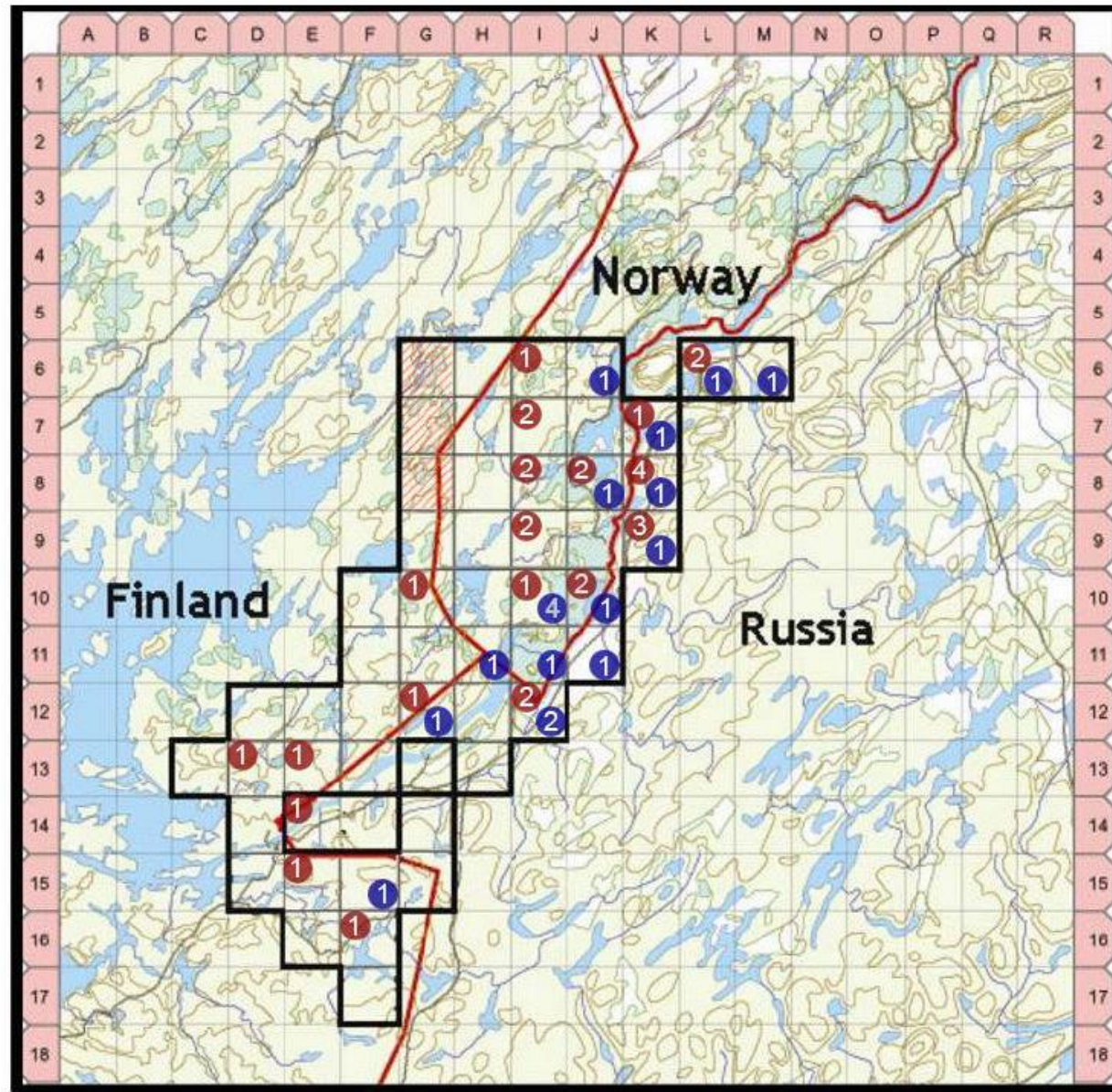


Figure 4: Results of the hair-trapping project to monitor brown bears in the trans-border area of Pasvik (Norway), Inari (Finland) and Pechenga in 2015, divided into a 5 km x 5 km grid. The red shaded grid squares indicate the grids, in which no hair traps were set-up in 2015 (see Materials and Methods). The number represents the number of individual bears identified and the gender is indicated by the colored dot (red = females, blue = males). The figure includes only individuals that have been identified by a full DNA-profile.

**Table 2:** Identity and gender for the 26 different brown bears documented by hair-trapping 2015 in Pasvik-Inari-Pechenga (Norway, Finland and Russia), country of registration, and the years of previous registration; F = females, M = males.

ID	Gender	Country	Detected in grid	Previous detection
FI111	F	NOR	I7, I8, I9	2010, 2011
FI116/LL49/MO48	F	NOR, FIN, RUS	G10, I10, I12, G12	2010
FI123/LL43/MO50	M	NOR, RUS	I11, J10, K7, J11	2011, 2012, 2013, 2014
FI160	F	NOR	J8, K8	2013
FI166	M	NOR	I8	2007, 2008
FI167	F	NOR	I6, I7	2014
FI180	F	NOR	I12	NEW
FI181	F	NOR	J10	NEW
FI182	M	NOR	I12	NEW
FI183	M	NOR	I10, H11	NEW
FI184	M	NOR	I12	NEW
FI185	F	NOR	I9	NEW
FI186	F	NOR	I8	NEW
FI38/MO18	F	RUS	K8, L6	2005, 2007, 2011
FI43/MO3	F	NOR	J8, K7, K8,	2005, 2007, 2008, 2009, 2010, 2011
FI69	M	NOR	I10	2007, 2011
FI70	M	NOR	I10, I8, J6, J8	2007, 2008, 2009, 2010, 2011
LL37	F	FIN	E15	2011
LL47	F	FIN	D13, E13, E14	NEW
LL48	F	FIN	F16	NEW
MO41	M	RUS	K8, K9, L6, M6	NEW
MO46	F	RUS	K9	NEW
MO47	F	RUS	K9	NEW
MO49	F	RUS	L6	NEW
MO8/LL44/FI177	M	RUS, FIN	F15, G12	2007, 2011
MO9	F	RUS	K8	2007, 2008

## Comparison of hair-trapping results from 2007, 2011 and 2015

**Table 3:** Number of samples collected and individuals identified from hair-trapping in 2007, 2011 and 2015 in Pasvik-Inari-Pechenga (Norway, Finland and Russia).

Year	Country	Number of grids	Number of samples collected	Number of individuals identified
2007	Norway	23	124	9
	Finland	23	56	9
	Russia	10	16	6
	<b>Total</b>	<b>56</b>	<b>196</b>	<b>24*</b>
2011	Norway	20	66	11
	Finland	26	14	7
	Russia	10	8	6
	<b>Total</b>	<b>56</b>	<b>88</b>	<b>20*</b>
2015	Norway	20	147	16
	Finland	23	20	5
	Russia	10	42	9
	<b>Total</b>	<b>53</b>	<b>209</b>	<b>26*</b>

\* Unique profiles, which do not include individuals registered in more than one country.

## Comparison of hair-trapping results from 2007, 2011 and 2015

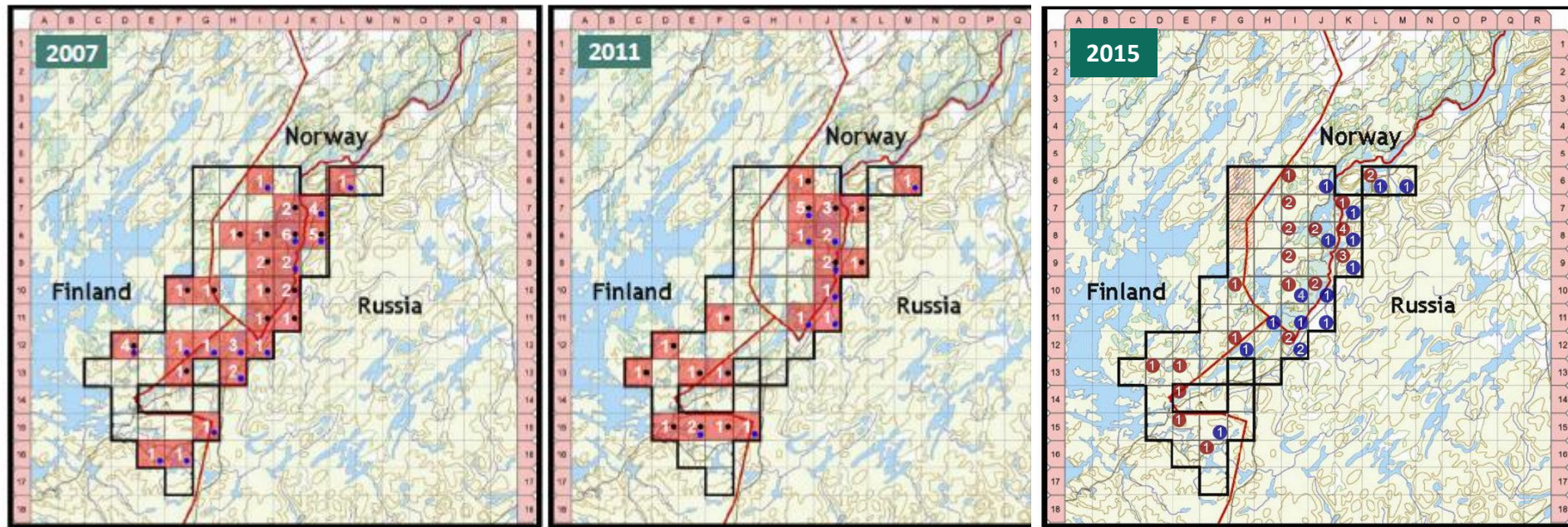




Figure 7: Selection of stills of brown bears filmed at the hair-traps during the period mid-June to mid-August in 2015.