

Long-term satellite tracking reveals patterns of long-distance dispersal in juvenile and adult Arctic foxes (*Vulpes lagopus*)

Richard Gravel, Sandra Lai and Dominique Berteaux

Supplementary material

Table S1: Results of the statistical analyses testing the effect of sex on movement metrics during the transience stage of adult Arctic foxes undertaking breeding long-distance dispersal (LDD) from Bylot Island (Nunavut, Canada). Superscripts indicate the use of permutation test because of the non-normality of the data (1) and reduced sample size (n=26) for All events (2).

	Males VS. Females			
	Complete LDD (n = 10)		All LDD (n = 27)	
Duration (days)	$t_8 = -1.29$	$p = 0.233$	$t_{25} = -0.46$	$p = 0.462$
Straight-line distance (km)	$t_8 = -0.61$	$p = 0.562$	$t_{25} = 0.14$	$p = 0.888$
Minimum distance travelled (km)	$t_{3.2} = -0.07^1$	$p = 0.950$	$t_{25} = -0.24$	$p = 0.814$
Linearity	$t_8 = -0.83$	$p = 0.432$	$t_{25} = 0.11$	$p = 0.916$
Average daily movement rate (km/day)	$t_8 = 0.56$	$p = 0.594$	$t_{25} = 1.15$	$p = 0.260$
<i>On land</i>²	$t_8 = 0.66$	$p = 0.528$	$t_{24} = 1.06$	$p = 0.300$
<i>On sea ice</i>²	$t_8 = -0.85$	$p = 0.420$	$t_{24} = 0.86$	$p = 0.397$
Average percentage of locations on sea ice (%)	$t_8 = -0.39$	$p = 0.708$	$t_{25} = 0.881$	$p = 0.387$

Table S2: Classification of the 170 collared Arctic foxes used in the analyses (148 adults and 22 juveniles). *Resident*: individual was a territory holder; *Transient*: individual was not a resident (removed from analyses); *SDD*: short-distance disperser (settled < 80 km from initial range); *LDD*: long-distance disperser (individual performed an extraterritorial movement that reached a distance of ≥ 80 km away from its territory and with no permanent return); *Interrupted LDD*: individual may have started a dispersal event but the nature of the movement was unconfirmed because collar failure or death (see “Note”); *Removed from analyses*: individuals were removed from the analyses if tracking was too short before their death or collar failure (see Note).

Fox ID	Life stage	Sex	Tracking used	Status	Successful immigration	Note
BBJB	Adult	M	Yes	LDD	Yes	
BBMJ	Adult	F	Yes	Resident		
BBMR	Adult	F	Yes	Interrupted LDD	NA	Collar failure
BBOJ	Adult	M	Yes	Resident		
BBOO	Adult	F	Yes	Resident		
BBRV	Adult	M	Yes	Resident		
BBVM	Adult	F	Yes	Resident		
BJOB	Adult	F	Yes	Resident		
BJOO	Adult	F	Yes	Resident		
BJVM	Adult	F	Yes	Resident		
BJVR	Adult	F	Yes	Resident		
BMBB	Adult	M	Yes	Transient		Removed from analyses
BMBR	Adult	M	Yes	Resident		
BMJJ	Adult	F	Yes	Resident		
BMRB	Adult	M	Yes	Resident		
BMRV	Adult	M	Yes	Transient		Removed from analyses
BMVJ	Adult	M	Yes	LDD	NA	Death
BOBB	Adult	M	Yes	Resident		
BOBO	Adult	M	Yes	Resident		
BOOO	Adult	M	Yes	LDD	NA	Death
BORV	Adult	F	Yes	Resident		
BRJM	Adult	M	Yes	Resident		
BRMR	Adult	M	Yes	Resident		
BROB	Adult	F	Yes	LDD	Yes	
BROR	Adult	M	Yes	Resident		
BROV	Adult	M	Yes	Resident		

Fox ID	Life stage	Sex	Tracking used	Status	Successful immigration	Note
BRRM	Adult	F	Yes	Resident		
BRRO	Adult	F	Yes	LDD	Yes	
BVJM	Adult	F	Yes	Resident		
BVVO	Adult	F	Yes	LDD	Yes	
JBBV	Adult	F	Yes	Resident		
JBJB	Adult	F	Yes	LDD	NA	Collar failure
JBMV	Adult	F	Yes	SDD	Yes	
JBRB	Adult	F	Yes	LDD	NA	Collar failure
JBRV	Adult	F	Yes	Resident		
JBVJ	Adult	F	Yes	Resident		
JBVM	Adult	M	Yes	LDD	NA	Death
JBVV	Adult	F	Yes	LDD	Yes	
JJBV	Adult	F	Yes	Resident		
JJIM	Adult	F	Yes	LDD	NA	Death
JJMB	Adult	M	Yes	Interrupted LDD	NA	Collar failure
JJMM	Adult	M	Yes	Resident		
JJMV	Adult	F	Yes	Resident		
JJVB	Adult	F	Yes	Resident		
JMJR	Adult	M	Yes	Resident		
JMMJ	Adult	M	Yes	Resident		
JMMR	Adult	F	Yes	SDD	Yes	
JMRM	Adult	F	Yes	Resident		
JMRR	Adult	M	Yes	Resident		
JOJO	Adult	F	Yes	Resident		
JRBM	Adult	M	Yes	Resident		
JRJO	Adult	M	Yes	LDD	NA	Death
JRMB	Adult	F	Yes	LDD	NA	Death
JRMM	Adult	M	Yes	LDD	Yes	
JRMR	Adult	M	Yes	Transient		Removed from analyses
JVBJ	Adult	F	Yes	Transient		Removed from analyses
JVJJ	Adult	F	Yes	Resident		
JVMM	Adult	M	Yes	Resident		
JVMR	Adult	F	Yes	Resident		
JVRB	Adult	F	Yes	LDD	Yes	
JVRM	Adult	M	Yes	Resident		
MBBJ	Adult	F	Yes	LDD	NA	Collar failure
MBRR	Adult	F	Yes	Resident		
MBRV	Adult	F	Yes	Resident		
MBVB	Adult	F	Yes	SDD	Yes	

Fox ID	Life stage	Sex	Tracking used	Status	Successful immigration	Note
MBVV	Adult	M	Yes	Resident		
MJBJ	Adult	M	Yes	Resident		
MJBR	Adult	F	Yes	Resident		
MJRR	Adult	F	Yes	LDD	Yes	
MJRV	Adult	F	Yes	Resident		
MJVJ	Adult	M	Yes	Resident		Seemed to have unstable home range (transient ?)
MMRV	Adult	M	Yes	LDD	Yes	
MMVM	Adult	M	Yes	LDD	NA	Death
MMVV	Adult	F	Yes	Interrupted LDD	NA	Death
MRBB	Adult	F	Yes	LDD	NA	Death
MRRR	Adult	M	Yes	Resident		
MRVR	Adult	F	Yes	Resident		
MVBR	Adult	M	Yes	Resident		
MVJJ	Adult	M	Yes	Interrupted LDD	NA	Collar failure
MVRR	Adult	M	Yes	Resident		
OBOV	Adult	F	Yes	Transient		Removed from analyses
OBJJ	Adult	M	Yes	Resident		
OJVJ	Adult	F	Yes	Resident		
OOOB	Adult	M	Yes	Resident		
OOOO	Adult	M	Yes	Resident		
OORR	Adult	F	Yes	Resident		
OIOB	Adult	M	Yes	LDD	NA	Collar failure
OROB	Adult	F	Yes	Resident		
OVBR	Adult	M	Yes	Resident		
OVOJ	Adult	F	Yes	Interrupted LDD	NA	Death
OVOV	Adult	F	Yes	Transient		Removed from analyses
OVVV	Adult	M	Yes	Resident		
RBBV	Adult	M	Yes	Resident		
RBJM	Adult	F	Yes	SDD	Yes	
RBJV	Adult	F	Yes	Resident		
RBMV	Adult	M	No	Removed from analyses	NA	Collar failure; tracking < 2 weeks
RBRJ	Adult	F	Yes	Resident		
RBRO	Adult	M	Yes	Resident		
RJBB	Adult	M	Yes	LDD	NA	Collar failure
RJJO	Adult	F	Yes	Resident		
RJMB	Adult	F	Yes	Resident		
RJMR	Adult	M	Yes	Resident		

Fox ID	Life stage	Sex	Tracking used	Status	Successful immigration	Note
RJOB	Adult	M	Yes	Resident		
RJVO	Adult	M	Yes	Resident		
RMRB	Adult	M	Yes	Resident		Seemed resident on Baffin (or transient)
ROJO	Adult	M	Yes	Resident		
ROOO	Adult	F	Yes	SDD	Yes	
RORO	Adult	M	Yes	Resident		
RRMM	Adult	M	Yes	Resident		
RRRR-1	Adult	F	Yes	Interrupted LDD	NA	Collar failure
RVBR	Adult	M	Yes	LDD	Yes	
RVBV	Adult	M	Yes	Resident		
RVJR	Adult	F	Yes	Resident		
RVMM	Adult	F	No	Removed from analyses	NA	Collar failure; tracking < 2 weeks
RVOO	Adult	F	Yes	Resident		
RVVB	Adult	F	Yes	Resident		
VBBJ	Adult	F	Yes	Resident		
VBBM	Adult	F	Yes	Resident		
VBJB	Adult	M	Yes	Resident		
VBJJ	Adult	F	Yes	Transient		Removed from analyses
VBJO	Adult	M	Yes	Resident		
VBJR	Adult	F	Yes	Resident		
VBOB	Adult	M	Yes	Resident		Seemed to use 2 distinct home ranges simultaneously
VBOO	Adult	M	Yes	Resident		
VJBB	Adult	M	Yes	Resident		
VJBR	Adult	F	Yes	Resident		
VJBV	Adult	M	Yes	Resident		
VJJB	Adult	M	Yes	Resident		
VMBB	Adult	M	Yes	LDD	NA	Death
VMJV	Adult	F	Yes	Resident		
VMMM	Adult	M	Yes	LDD	NA	Death
VMRR	Adult	M	Yes	LDD	NA	Death
VOBR	Adult	M	Yes	Resident		
VOJV	Adult	F	Yes	Resident		
VORB	Adult	F	Yes	Resident		
VOVO	Adult	M	Yes	Resident		
VRBJ	Adult	M	Yes	Resident		
VRJB	Adult	F	Yes	Resident		

Fox ID	Life stage	Sex	Tracking used	Status	Successful immigration	Note
VRJO	Adult	M	Yes	Resident		
VROB	Adult	M	Yes	Interrupted LDD	NA	Death
VROO	Adult	M	Yes	Resident		
VRRR	Adult	M	Yes	Resident		
VVBJ	Adult	M	Yes	Resident		
VVBR	Adult	F	Yes	Interrupted LDD	NA	Collar failure
VVMM	Adult	M	Yes	Resident		
VVOO	Adult	F	Yes	Resident		
VVOV	Adult	M	Yes	LDD	NA	Collar failure
VVVM	Adult	M	Yes	Resident		
BBRM	Juvenile	F	No	Removed from analyses	NA	Died in natal range; tracking < 2 months
BBVR	Juvenile	M	Yes	LDD	NA	Collar failure
BJOJ	Juvenile	F	Yes	SDD	Yes	
BOBJ	Juvenile	M	Yes	LDD	NA	Collar failure
BORJ	Juvenile	M	Yes	LDD	Yes	
JOOB	Juvenile	M	Yes	LDD	Yes	
JOOJ	Juvenile	M	Yes	LDD	NA	Death
JROJ	Juvenile	M	Yes	Interrupted LDD	NA	Death
MBBM	Juvenile	M	No	Removed from analyses	NA	Collar failure; tracking < 2 weeks
MJVM	Juvenile	M	No	Removed from analyses	NA	Collar failure; tracking < 2 weeks
OJBR	Juvenile	M	Yes	LDD	NA	Collar failure
OJOR	Juvenile	M	Yes	LDD	NA	Collar failure
OOBV	Juvenile	M	Yes	SDD	Yes	
OORO	Juvenile	M	Yes	LDD	Yes	
ORRB	Juvenile	F	No	Removed from analyses	NA	Died in natal range; tracking < 2 months
RROB	Juvenile	F	Yes	Interrupted LDD	NA	Death
RVMR	Juvenile	M	Yes	Interrupted LDD	NA	Death
VJRB	Juvenile	F	No	Removed from analyses	NA	Died in natal range; tracking < 2 months
VOBJ	Juvenile	F	Yes	Interrupted LDD	NA	Death
VOOB	Juvenile	M	Yes	LDD	NA	Collar failure
VVBO	Juvenile	F	No	Removed from analyses	NA	Died in natal range; tracking < 2 months
VVOB	Juvenile	F	Yes	LDD	NA	Death

Video S1: Dynamic display of the transience phase of long-distance dispersal performed by 27 adult and 10 juvenile Arctic foxes equipped with Argos Platform Terminal Transmitters on Bylot Island (Nunavut, Canada) from 2007-2021. Each path line starting from Bylot Island represents one individual.