

Supplementary material

Appendix 1

Table A1: Migration schedule of Ringed Plovers breeding in the Canadian Arctic and tracked with geolocators. Individual 14a was tracked for 1.5 year and the second autumn migration (noted as 14b) was excluded from analyses to avoid pseudo-replication. The exact date of departure from and arrival at the breeding site were unknown because of extensive polar daylight. We used the first and last dates detected in the North (i.e. dates when a bird was successfully located) to characterize autumn and spring migration phenology, respectively. First and last stopovers detected in the North were Baffin Island (Baf) in Canada, Greenland (GL) or Iceland (IS). Total detour (%) was calculated using the ratio between the distance between staging sites and the distance between the breeding and wintering site of each individual. In autumn, migration rate was calculated between Greenland and the wintering site and, in spring, from the wintering site to the last stopover used in spring (Greenland or Iceland).

Individual	1	2	3	4	5	6	7	8	9	10	11	12	13	14a	14b	15	16	17	18	19	20	
Deployment year	2014	2014	2014	2014	2014	2014	2015	2015	2015	2015	2015	2015	2015	2015	2015	2016	2016	2016	2016	2016	2016	
Sex	m	f	f	f	m	m	f	f	m	f	f	m	f	m	m	m	m	m	m	f	m	f
Autumn migration																						
First date detected	11/08*	01/08	03/08	11/08*	06/08*	11/08*	08/08	06/08	07/08	06/08	06/08*	07/08	07/08	01/08*	12/08	08/08*	07/08*	02/08*	04/08	02/08	01/08	
First stopover detected	Baf	GL	GL	Baf	Baf	GL	GL	GL	GL	GL	Baf	GL	GL	Baf	GL	GL	Baf	GL	GL	Baf	GL	
Number of stopovers	4	3	3	4	4	3	4	4	5	3	4	2	2	4	5	2	3	3	2	3	2	
Iceland stopover	yes	no	no	no	no	no	no	yes	yes	yes	no	no	no	no	no	no	no	no	no	no	no	
Distance travelled (km)	8998	9011	9124	8759	8505	8959	8815	6905	8901	8752	8049	8276	8800	8387	8818	8153	8219	8345	9063	8191	7944	
Total detour (%)	16.1	16.2	16.4	13.8	15.3	15.4	14.1	12.3	16.6	15.5	14.2	11.4	10.8	19.6	20.4	9.0	7.1	11.7	14.9	7.7	9.1	
Duration from Greenland stopover to winter site (days)	39	28	31.5	47.5	47	28.5	NA	82.5	49.5	28	NA	26	25	34	36	20.5	22.5	34	24	27.5	24	
Distance from Greenland stopover to winter site (km)	7493	7167	7596	7229	7012	7166	7177	5071	7355	6931	6520	6573	7225	7274	7176	6990	6547	6850	7218	6462	6016	
Migration rate (km/day)	191	258	239	153	149	251	NA	61	148	249	NA	255	287	214	198	339	290	203	298	235	249	
Winter residence period																						
Arrival date	23/09*	28/08	03/09	05/10*	26/09*	08/09	NA	28/10	25/09*	02/09	NA	01/09	01/09	19/09*	17/09	28/08	04/09	04/09	28/08	05/09	25/08	
Departure date	NA	NA	NA	11/04	24/04	02/05	31/03	24/02	11/04	16/04	19/04	23/04	21/04	06/05	NA	11/04	08/05	02/04	15/04	15/04	18/04	
Duration (days)	NA	NA	NA	188.5	210.5	236	169	119	198.5	226	190	234	233	229	NA	226.5	245.5	210.5	230.5	222.5	236.5	
West Africa mean latitude N	14°56'	14°59'	14°13'	14°56'	18°21'	14°52'	14°41'	-	16°17'	16°29'	21°15'	17°09'	12°27'	22°39'	20°10'	16°12'	14°30'	16°47'	13°41'	15°02'	18°08'	
N-W Africa mean latitude N	-	-	-	-	-	-	-	31°59'	-	-	-	-	-	-	-	-	-	-	-	-	-	
Direct distance between winter and breeding sites (km)	7548	7550	7628	7551	7206	7578	7574	6056	7424	7391	6904	7330	7853	6746	6746	7417	7638	7369	7714	7558	7221	
Spring migration																						
Last date detected	NA	NA	NA	28/05*	08/06*	10/06*	26/05*	28/05*	22/05*	05/06*	31/05	30/05*	01/06*	03/06*	NA	31/05*	30/05*	20/05*	24/05	20/05*	29/05*	
Last stopover detected	NA	NA	NA	GL	GL	GL	IS	GL	GL	GL	GL	GL	GL	IS	NA	IS	IS	IS	GL	GL	GL	
Number of stopovers	NA	NA	NA	5	5	4	4	4	5	5	5	4	3	6	NA	5	3	5	4	5	4	
Iceland stopover	NA	NA	NA	yes	no	yes	yes	yes	yes	yes	yes	yes	no	yes	NA	yes	yes	yes	yes	yes	yes	
Distance travelled (km)	NA	NA	NA	9275	8859	9233	8527	7028	8615	8787	8683	8848	9109	8155	NA	8562	8417	8376	9278	8658	8564	
Total detour (%)	NA	NA	NA	18.6	18.7	17.9	11.2	13.8	13.8	15.9	20.5	17.2	13.8	17.3	NA	13.4	9.3	12.0	16.9	12.7	15.7	
Duration to last stopover (days)	NA	NA	NA	47	45	37	56	92	40.5	50	41	37	40.5	28	NA	47	22	48	39	35	41	
Distance to last stopover (km)	NA	NA	NA	7556	7229	7231	6034	5503	7134	7380	6789	7384	7124	5751	NA	6051	5892	5933	7697	7450	7198	
Migration rate (km/day)	NA	NA	NA	161	161	196	107	60	177	148	165	200	177	207	NA	128	271	123	198	214	176	

*Dates estimated using longitude only because of extensive polar daylight or equinox period

Table A2: Migration schedule for the Atlantic Ocean crossing of Ringed Plovers breeding in the Canadian Arctic and tracked with geolocators. Individual 14a was tracked for 1.5 year and the second autumn migration is identified as 14b. Arrival and departure dates calculated for Greenland and Iceland were estimated using a light threshold of 50 units to account for extensive daylight in these regions in late spring. Arriving and departing regions in Europe were the British Isles (Brls, i.e. United Kingdom and Ireland), France (FR) or the Iberian Peninsula (Ibe, i.e. Spain and Portugal).

Individual	1	2	3	4	5	6	7	8	9	10	11	12	13	14a	14b	15	16	17	18	19	20
Deployment year	2014	2014	2014	2014	2014	2014	2015	2015	2015	2015	2015	2015	2015	2015	2015	2016	2016	2016	2016	2016	2016
Sex	m	f	f	f	m	m	f	f	m	f	f	m	f	m	m	m	m	m	f	m	f
Autumn migration																					
Greenland departure date	24/08	10/08	15/08	06/09	21/08	18/08	16/08	16/08	13/08	12/08	09/09	12/08	12/08	27/08	20/08	11/08	21/08	10/08	13/08	18/08	11/08
Iceland arrival date	26/08	-	-	-	-	-	18/08	17/08	15/08	-	-	-	-	-	-	-	-	-	-	-	-
Iceland departure date	06/09	-	-	-	-	-	28/08	25/08	25/08	-	-	-	-	-	-	-	-	-	-	-	-
Europe arrival date	09/09	12/08	18/08	10/09	24/08	20/08	29/08	27/08	27/08	14/08	11/09	14/08	13/08	30/08	22/08	13/08	23/08	12/08	16/08	21/08	13/08
Arriving region	Ibe	FR	FR	Brls	Brls	FR	Brls	Brls	Brls	FR	Ibe	Brls	Brls	Ibe	Brls	rBls	Ibe	Brls	Brls	Brls	Ibe
Non-stop transatlantic flight (km)	-	3129	3154	2754	2382	3722	-	-	-	3598	3920	2750	2756	4204	2257	2873	3983	2615	2886	3857	3234
Greenland to Iceland flight (km)	1784	-	-	-	-	-	1475	1180	1683	-	-	-	-	-	-	-	-	-	-	-	-
Iceland to Europe flight (km)	3667	-	-	-	-	-	1097	1448	981	-	-	-	-	-	-	-	-	-	-	-	-
Spring migration																					
Europe departure date	NA	NA	NA	13/05	26/05	26/05	12/05	08/05	08/05	12/05	12/05	11/05	19/05	29/05	NA	21/05	25/05	14/05	11/05	12/05	10/05
Departing region	NA	NA	NA	Brls	Brls	Brls	FR	Brls	Brls	Brls	Brls	Brls	Brls	Brls	NA	Brls	Brls	Brls	Brls	Brls	Brls
Iceland arrival date	NA	NA	NA	14/05	-	27/05	13/05	09/05	10/05	15/05	14/05	12/05	-	31/05	NA	22/05	27/05	15/05	12/05	13/05	11/05
Iceland last date detected	NA	NA	NA	25/05	-	30/05	26/05	18/05	15/05	28/05	23/05	22/05	-	03/06	NA	28/05	30/05	20/05	15/05	17/05	16/05
Greenland arrival date	NA	NA	NA	27/05	01/06	02/06	NA	21/05	17/05	31/05	27/05	25/05	23/05	NA	NA	NA	NA	NA	18/05	18/05	19/05
Non-stop transatlantic flight (km)	NA	NA	NA	-	2366	-	-	-	-	-	-	-	2347	-	NA	-	-	-	-	-	-
Europe to Iceland flight (km)	NA	NA	NA	1067	-	1343	1020	1428	1358	2475	987	1151	-	1185	NA	908	1444	1456	1241	1147	1337
Iceland to Greenland flight (km)	NA	NA	NA	1507	-	1322	NA	1400	1318	1509	1471	1595	-	NA	NA	NA	NA	NA	1631	1481	1452