

# The desert at Zait Bay, Egypt: a bird migration bottleneck of global importance

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## Supplementary material

Supplementary material 1. Coordinates of the observation sites. The observations were performed in the desert at Zait Bay in the time period between the February 20 and May 6 2007.

site	E (degrees)	N (degrees)
M01	33,44	27,70
M02	33,45	27,73
M03	33,43	27,78
M04	33,40	27,81
M05	33,37	27,82
M06	33,35	27,89
M07	33,32	27,93
M08	33,29	27,97
M09	33,26	28,00
M10	33,23	28,04
M11	33,21	28,09
M12	33,19	28,13
M13	33,15	28,17
S01	33,49	27,69
S02	33,51	27,73
S03	33,48	27,78
S04	33,46	27,81
S05	33,44	27,85
S06	33,41	27,89
S07	33,33	27,93
S08	33,36	27,96
S09	33,32	28,00
S10	33,29	28,04
S11	33,26	28,07
S12	33,25	28,12
S13	33,23	28,16

Supplementary material 2. The number of days and of hours per day the extrapolation for each species is based on. The multiplication factor is the factor by which the bird frequency is multiplied to extrapolate the number of birds per season. The observations were performed in the desert at Zait Bay in the time period between the February 20 and May 6 2007.

Species	Hours per day	Number of days	Multiplication factor
White Pelican	9	33	297
White Stork	8	47	376
Black Stork	8	53	424
Black Kite	10	37	370
Egyptian Vulture	9	65	585
Montagu's Harrier	11	39	429
Pallid Harrier	11	63	693
Marsh Harrier	11	42	462
Levant Sparrowhawk	8	12	96
Honey Buzzard	9	10	90
Steppe Buzzard	9	48	432
Long-legged Buzzard	9	48	432
Steppe Eagle	9	55	495
Lesser Spotted Eagle	9	63	567
Booted Eagle	9	36	324
Short-toed Eagle	9	50	450
Kestrel	9	58	522
Lesser Kestrel	9	45	405
Common Crane	8	12	96
Bee-eater	9	22	198

Supplementary material 3. observation hours during migration days and hours of each species (n), the median number of birds per hour (frequency) and the range of migration frequencies. The observations were performed in the desert at Zait Bay in the time period between the February 20 and May 6 2007.

Species	(n)	Median (frequency)	Range (frequency)
White Pelican	525	0	250
White Stork	521	0	25025
Black Stork	460	0	130
Black Kite	512	0	171
Egyptian Vulture	413	0	8
Pallid Harrier	13	0	2
Levant Sparrowhawk	203	0	3000
Honey Buzzard	106	0	11
Steppe Buzzard	535	0	1103
Long-legged Buzzard	385	0	13
Steppe Eagle	446	0	138
Spotted Eagle	9	0	2
Lesser Spotted Eagle	535	0	11
Booted Eagle	400	0	10
Short-toed Eagle	462	0	8
Lesser Kestrel	20	0	2
Common Crane	349	0	1197

Supplementary material 4. Mean and confidence interval of average migration magnitude at the different sites. The observations were performed in the desert at Zait Bay in the time period between the February 20 and May 6 2007.

Species		M01	M02	M03	M04	M05	M06	M07	M08	M09	M10	M11	M12	M13
White Pelican	n	20	20	18	15	16	16	16	19	16	21	22	24	22
	mean		0.1		5.0	12.5					10.8			
	conf. -95		-0.1		-5.7	-14.1					-9.6			
	conf.+95		0.2		15.7	39.1					31.2			
White Stork	n	20	20	18	15	16	16	16	19	16	21	22	23	21
	mean	5.0	174.1	44.9	225.1	1.8	127.5	229.6	52.1	25.0	27.1	4.0	0.0	43.3
	conf. -95	-5.5	-84.2	-48.8	-30.0	-1.4	-26.3	-224.9	-39.5	-11.4	-12.2	-4.4		-15.6
	conf.+95	15.5	432.3	138.7	480.3	4.9	281.3	684.1	143.7	61.4	66.5	12.5		102.2
Black Stork	n	17	17	16	14	15	14	14	19	15	16	19	20	19
	mean	0.2	3.4	3.4	2.6	0.1	2.5	3.1	0.3		0.2	1.2	1.0	
	conf. -95	-0.1	-3.5	-2.3	-2.6	-0.2	-1.2	-2.2	-0.3		-0.1	-1.0	-0.9	
	conf.+95	0.4	10.2	9.2	7.9	0.4	6.2	8.5	1.0		0.5	3.4	2.9	
Black Kite	n	20	19	17	15	17	16	18	19	16	20	21	23	21
	mean	3.0	1.0	4.2	1.7	5.5	3.6	1.4	1.1	1.8	1.7	1.1	4.0	3.2
	conf. -95	-1.1	-0.7	-3.9	-0.6	-0.9	-2.4	-0.6	-0.2	0.2	-0.4	-0.5	-4.0	-3.1
	conf.+95	7.1	2.7	12.3	4.1	12.0	9.5	3.4	2.3	3.5	3.8	2.7	11.9	9.6
Egyptian Vulture	n	16	15	15	13	15	14	13	17	13	16	16	17	15
	mean			0.1	0.1	0.3	0.4	0.7	0.2	0.2	0.1	0.2	0.2	0.4
	conf. -95			-0.2	-0.1	-0.2	-0.1	-0.6	-0.2	-0.1	-0.1	-0.2	-0.2	-0.2
	conf.+95			0.4	0.2	0.7	0.8	2.0	0.6	0.6	0.4	0.6	0.6	1.0
Pallid Harrier	n	17	16	15	13	15	15	13	17	13	20	19	21	18
	mean							0.1	0.1		0.1			
	conf. -95							-0.1	-0.1		-0.1			
	conf.+95							0.2	0.2		0.2			
Levant Sparrowhawk	n	8	5	8	7	8	5	6	8	7	6	7	9	8
	mean			1.1	0.3	0.5	10.0	500.0	221.8	114.4				0.1

	conf. -95			-0.7	-0.4	-0.7	-17.8	-785.3	-302.6	-165.2				-0.2
	conf.+95			3.0	1.0	1.7	37.8	1785.3	746.1	394.0				0.4
Honey Buzzard	n	5	5	7	5	4	3	4	3	6	4	6	6	5
	mean		0.2	1.4	2.0	1.3	1.0	2.5	0.7			0.3	1.8	1.4
	conf. -95		-0.4	-1.0	-2.9	-2.7	-3.3	-2.4	-2.2			-0.5	-2.9	-2.5
	conf.+95		0.8	3.8	6.9	5.2	5.3	7.4	-2.2			1.2	6.5	5.3
Steppe Buzzard	n	21	21	18	16	17	17	16	20	17	21	22	24	22
	mean	12.8	4.8	59.3	3.0	65.5	21.6	5.4	1.6	6.8	1.2	32.6	0.1	5.0
	conf. -95	-3.8	-2.5	-64.3	-1.2	-72.0	-6.3	-1.1	0.0	-4.0	-0.7	-33.6	0.0	-3.8
	conf.+95	29.3	12.1	182.9	7.2	202.9	49.6	12.0	3.1	17.6	3.1	98.8	0.3	13.8
Long-legged Buzzard	n	14	14	14	11	13	14	13	16	13	15	16	17	16
	mean	0.1	0.1	0.1			0.6		0.1	0.2		0.4		0.1
	conf. -95	-0.2	-0.1	-0.1			-0.2		-0.1	-0.2		-0.5		-0.1
	conf.+95	0.5	0.2	0.4			1.4		0.2	0.5		1.4		0.2
Steppe Eagle	n	18	18	17	14	17	17	13	19	14	16	17	20	18
	mean	0.4	0.6	2.1	1.4	4.6	1.5	5.7	0.6	1.8	0.7	1.6	7.8	7.2
	conf. -95	-0.1	0.0	0.3	-0.2	-0.2	-0.1	-1.1	-0.1	0.2	0.2	-0.7	-4.0	-1.7
	conf.+95	1.0	1.2	3.8	2.9	9.4	3.0	12.4	1.2	3.4	1.2	3.9	19.5	-1.7
Spotted Eagle	n	9	6	7	6	7	8	6	9	8	9	8	8	8
	mean			0.1						0.1			0.1	0.1
	conf. -95			-0.2						-0.2			-0.2	-0.2
	conf.+95			0.5						0.4			0.4	0.4
Lesser Spotted Eagle	n	21	22	19	15	19	20	18	18	18	21	21	22	22
	mean	0.1	0.1	0.3	0.1	0.3	0.2	0.5		0.2	0.1	0.1	0.5	0.2
	conf. -95	0.0	-0.1	0.0	-0.1	0.0	0.0	-0.1		-0.1	0.0	-0.1	-0.5	-0.1
	conf.+95	0.2	0.3	0.6	0.2	0.5	0.4	1.1		0.4	0.2	0.3	1.5	0.5
Short-toed Eagle	n	18	18	16	13	16	16	15	18	14	20	18	21	18
	mean		0.2	0.2	0.1	0.1	0.2	0.3	0.1	0.1	0.3		0.1	0.4
	conf. -95		0.0	-0.1	-0.1	-0.1	-0.2	-0.1	-0.1	-0.1	0.0		-0.2	0.0
	conf.+95		0.4	0.5	0.2	0.3	0.4	0.6	0.3	0.4	0.5		0.4	0.8
Booted Eagle	n	17	15	14	11	13	15	14	13	13	17	16	19	17
	mean	0.2	0.1	1.0	0.3	0.6	0.4	0.9	0.5		0.1	0.1	0.1	0.2
	conf. -95	0.0	-0.1	-0.1	-0.3	-0.4	-0.2	-0.7	-0.5		-0.1	-0.1	-0.1	-0.3
	conf.+95	0.4	0.2	2.2	1.4	1.6	1.0	2.4	1.5		0.2	0.3	0.3	0.7

Lesser Kestrel	n	11	9	11	9	9	10	9	11	7	10	12	14	12
	mean	0.1	0.1				0.4				0.2	0.2		
	conf. -95	-0.1	-0.2				-0.1				-0.3	-0.2		
	conf.+95	0.3	0.5				0.9				0.7	0.5		
Common Crane	n	16	14	13	9	11	13	11	17	10	14	12	15	15
	mean	10.3	10.7	6.2	1.3	29.1	3.4	100.0	57.0		5.7		0.7	5.3
	conf. -95	-11.0	-12.4	-6.3	-1.7	-35.7	-3.3	-122.8	-39.4		-6.6		-0.8	-6.1
	conf.+95	31.5	33.9	18.8	4.4	93.9	10.1	322.8	134.5		18.1		2.1	16.8

Species		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12	S13
White Pelican	n	24	21	22	22	21	21	20	21	21	20	20	22	24
	mean			13.7								1.2		2.2
	conf. -95			-10.1								-1.2		-1.0
	conf.+95			37.5								3.6		5.4
White Stork	n	23	23	21	21	21	21	20	21	21	20	20	22	24
	mean	132.6	12.4	33.4	106.9		0.3	1372.3	104.8	47.7	49.0	155.1	41.4	
	conf. -95	-142.4	-5.6	-36.2	-77.5		-0.3	-1238.9	-62.2	-33.3	-11.8	-169.5	-44.7	
	conf.+95	407.6	30.4	102.9	291.2		0.9	3983.5	271.7	128.6	109.8	479.7	127.4	
Black Stork	n	23	20	20	18	17	19	15	18	19	18	18	19	21
	mean	1.6	15.8	11.6	1.2		2.6		0.1			6.1	5.1	4.8
	conf. -95	-0.7	-1.6	-2.1	-1.0		-2.8		-0.1			-6.8	-4.4	-2.6
	conf.+95	3.8	33.1	25.2	3.5		8.0		0.2			19.0	14.5	12.2
Black Kite	n	23	22	21	20	21	20	19	21	21	20	19	20	23
	mean	2.3	0.8	0.1	1.1	0.5	3.9	3.1	0.2	1.6	5.4	2.2	9.3	7.2
	conf. -95	0.0	-0.1	0.0	0.1	-0.1	-1.5	-1.1	0.0	0.0	-2.2	-1.8	-8.5	-7.5
	conf.+95	4.6	1.7	0.2	2.2	1.1	9.2	7.3	0.4	3.1	13.0	6.1	27.1	21.5
Egyptian Vulture	n	21	18	17	16	16	18	13	15	16	16	17	17	18
	mean	0.0	0.4	0.1	0.2	0.1	0.1	0.1		0.1				
	conf. -95	-0.5	-0.2	-0.1	-0.2	-0.1	0.0	-0.1		-0.1				
	conf.+95	0.1	1.0	0.2	0.6	0.2	0.3	0.2		0.2				
Pallid Harrier	n	21	20	18	17	19	19	17	17	18	16	17	18	20
	mean	0.0						0.1				0.1	0.1	0.1
	conf. -95	-0.1						-0.1				-0.1	0.0	-0.1
	conf.+95	0.1						0.2				0.3	0.3	0.2

Levant Sparrowhawk	n	10	8	9	7	7	9	8	7	8	9	10	9	10
	mean	0.1	55.0	1.8			0.1							
	conf. -95	-0.1	-75.1	-1.5			-0.1							
	conf.+95	0.3	185.1	5.1			0.4							
Honey Buzzard	n	4	4	5	3	2	3	4	5	5	6	5	4	5
	mean	0.8	1.8	0.6			2.3	1.0	0.2	0.8	0.3	0.8		
	conf. -95	-1.6	-2.8	-1.1			-7.7	-1.3	-0.4	-0.8	-0.2	-0.8		
	conf.+95	3.1	6.3	2.3			12.4	3.3	0.8	2.4	0.9	2.4		
Steppe Buzzard	n	24	22	21	22	22	22	21	22	21	20	20	22	24
	mean	2.7	7.5	29.4	15.0	1.6	28.3	24.2	3.1	5.6	1.0	0.2	3.8	0.6
	conf. -95	-0.3	-2.7	-30.9	-12.8	-1.4	-29.8	-16.8	-1.5	-6.0	-0.8	0.0	-2.1	0.0
	conf.+95	5.6	17.7	89.8	42.8	4.7	86.5	65.2	7.8	17.2	2.8	0.4	9.6	1.2
Long-legged Buzzard	n	18	15	15	14	13	15	12	15	13	15	17	18	19
	mean	0.2	0.9	0.1	0.4		0.3	0.3	0.2	0.3	0.2	0.1		0.1
	conf. -95	0.0	-0.9	-0.1	0.0		-0.1	-0.1	-0.1	0.0	-0.2	-0.1		-0.1
	conf.+95	0.4	2.8	0.3	0.7		0.6	0.6	0.5	0.6	0.6	0.2		0.2
Steppe Eagle	n	21	18	16	18	17	18	16	16	17	16	18	19	18
	mean	5.6	12.5	4.7	3.4	0.9	1.6	7.9	2.8	2.2	2.5	1.2	3.1	6.2
	conf. -95	-3.5	-4.4	-0.1	0.7	-0.7	-0.9	-1.4	-1.7	-1.7	-1.1	-0.4	-3.4	-6.7
	conf.+95	14.6	29.4	9.5	6.2	2.5	4.0	17.3	7.3	6.0	6.1	2.9	9.6	19.1
Spotted Eagle	n	11	8	8	8	8	8	6	7	8	6	7	8	8
	mean	0.1	0.3											
	conf. -95	-0.1	-0.3											
	conf.+95	0.3	0.8											
Lesser Spotted Eagle	n	21	24	19	22	20	21	24	22	21	19	21	22	23
	mean	0.0	0.3	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.1	0.0	0.1
	conf. -95	-0.1	0.0	-0.1	0.0	-0.1	0.0	0.0	-0.2	-0.2	-0.2	-0.1	0.1	-0.1
	conf.+95	0.1	0.5	0.3	0.2	0.2	0.5	0.4	0.6	0.8	0.5	0.4		0.3
Short-toed Eagle	n	20	19	18	19	18	18	18	17	18	18	18	20	20
	mean	0.1	0.1	0.2	0.1		0.2	0.3	0.2	0.5	0.2	0.2	0.1	0.1
	conf. -95	-0.1	0.0	-0.1	-0.1		0.0	0.0	-0.1	-0.4	0.0	-0.1	0.0	-0.1
	conf.+95	0.3	0.3	0.4	0.2		0.4	0.6	0.5	1.4	0.4	0.4	0.2	0.2
Booted Eagle	n	16	17	17	15	14	15	14	16	15	16	14	17	20
	mean	0.1	0.4		0.9	0.3	0.2	0.5	0.3	0.3		0.2	0.1	

	conf. -95	-0.1	-0.2		-0.5	-0.1	-0.1	-0.5	-0.2	0.0		-0.1	-0.1	
	conf.+95	0.3	0.9		2.4	0.6	0.5	1.7	0.7	0.5		0.5	0.2	
Lesser Kestrel	n	11	11	11	9	11	11	11	11	11	12	11	10	10
	mean	0.2		0.1	0.2		0.1	0.2					0.1	
	conf. -95	-0.1		-0.1	-0.1		-0.1	-0.1					-0.1	
	conf.+95	0.5		0.3	0.6		0.3	0.5					0.3	
Common Crane	n	19	15	13	15	16	14	10	12	13	12	11	13	16
	mean	21.3	79.8	14.0	12.7	31.3	7.7	2.3	6.3	27.7	45.0			0.3
	conf. -95	-17.4	-91.4	-11.3	-13.0	-15.3	-8.0	-2.9	-7.5	-32.6	-54.0			-0.4
	conf.+95	60.0	251.0	39.3	38.3	77.8	23.4	7.5	20.0	88.0	144.0			1.0



Supplementary material 5. Resting birds in the study area during the systematic observations. The observations were performed in the desert at Zait Bay in the time period between the February 20 and May 6 2007. Wp = White Pelican, Reef = Western Reef Heron, Squ = Squacco Heron, Grey = Grey Heron, Egr spec. = Egrets spec., Wst = White Stork, Bst = Black Stork, Spo = Spoonbill, Fla = Flamingo, Mon = Montagu's Harrier, PMh = Pallid or Montagu's Harrier, Mh = Marsh Harrier, Levs = Levant Sparrowhawk, Spa = Sparrowhawk, Hob = Honey Buzzard, Stb = Steppe Buzzard, Buz spec.. = Buzzard spec., Ste = Steppe Eagle, She = Short-toed Eagle, Kes = Kestrel, Osp = Osprey, Ke = Kestrel, Ho = Hobby, Cc = Common Crane, B-e = Bee-eater.

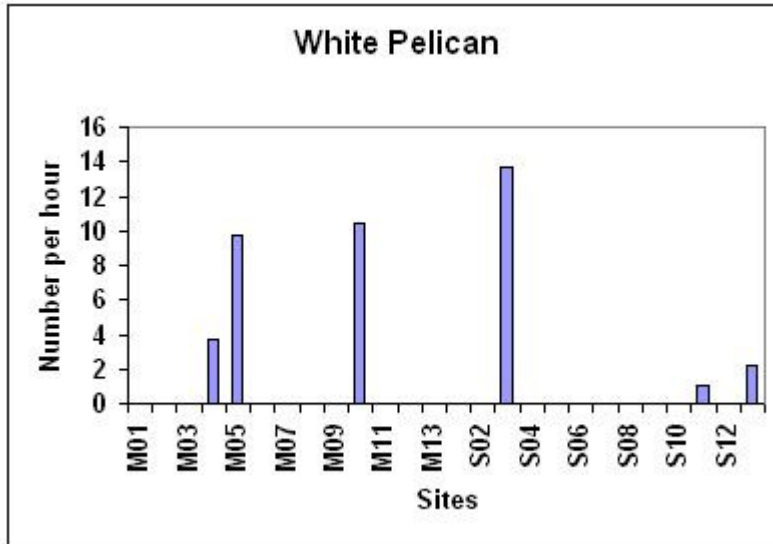
Species	Wp	Squ	Fla	Reef	Egr	Wst	Bst	Bk	PMh	Mh	Stb	Buz	Ste	Eagle	She	Kes	Osp	Cc	B-e	Total
Site					spec.							spec.		spec.						
M01							2				3		1			1				7
M02											2						1	120		123
M03						9					6			5	1			3		24
M04						700	1	10			19							12		742
M05						24					25									49
M06											1									1
M07						95					1	1								97
M08								2			58									60
M09																				0
M10																		60		60
M11																				0
M12																1		5		6
M13						574														574
S01											1									1
S02																				0
S03											3									3
S04						94					5									99
S05											4					1				5
S06																1				1
S07						160		3			1									164
S08											2		2							4

S09								1												1	
S10											1					1				2	
S11														1						1	
S12											2					3			7	12	
S13	53	6	24	81	3		28		1	1	6							4		207	
sum	53	6	24	81	3	1656	31	16	1	1	140		1	3	6	1	8	1	204	7	2243

Supplementary material 6. Difference of bird frequency between sites evaluated for each species, according to the Kruskal-Wallis test. Chi-square, df (degrees of freedom) and P-values are shown. Only species with more than 50 birds per season are included. The observations were performed in the desert at Zait Bay in the time period between the February 20 and May 6 2007.

Species	Chi-square	Df	P
White Pelican	42.796	25	0.015
White Stork	36.750	25	0.060
Black Stork	26.951	25	0.980
Black Kite	28.747	25	0.275
Egyptian Vulture	20.098	25	0.742
Pallid Harrier	26.497	25	0.382
Levant Sparrowhawk	23.792	25	0.530
Honey Buzzard	15.155	25	0.454
Steppe Buzzard	30.876	25	0.193
Long-legged Buzzard	32.499	25	0.144
Steppe Eagle	32.615	25	0.193
Spotted Eagle	19.030	25	0.796
Short-toed Eagle	22.775	25	0.591
Booted Eagle	29.283	25	0.252
Lesser Kestrel	32.820	25	0.136
Common Crane	12.737	25	0.980

Supplementary material 7. Average number of White Pelicans per hour at the different observation sites. The observations were performed in the desert at Zait Bay in the time period between the February 20 and May 6 2007.



Supplementary material 8. Percentage of the flyway population per species and per site, evaluated on the basis of the observations within a radius of 2.5 km of each site. Species occurring in numbers below 1% of the flyway population at any site are excluded. The observations were performed in the desert at Zait Bay in the time period between the February 20 and May 6 2007.

Species	M01	M02	M03	M04	M05	M06	M07	M08	M09	M10	M11	M12	M13
White Pelican	0.0	0.0	0.0	<b>1.4</b>	<b>3.6</b>	0.0	0.0	0.0	0.0	<b>3.4</b>	0.0	0.0	0.0
White Stork	0.2	<b>7.4</b>	<b>2.0</b>	<b>8.3</b>	0.1	<b>5.0</b>	<b>8.9</b>	<b>2.1</b>	0.9	<b>1.2</b>	0.2	0.0	<b>2.0</b>
Black Stork	0.2	<b>3.3</b>	<b>3.4</b>	<b>2.1</b>	0.1	<b>2.1</b>	<b>2.6</b>	0.3	0.0	0.2	<b>1.2</b>	<b>1.0</b>	0.0
Black Kite	<b>2.2</b>	0.9	<b>3.0</b>	<b>1.3</b>	<b>4.7</b>	<b>2.9</b>	<b>1.2</b>	0.9	<b>1.3</b>	<b>1.5</b>	<b>1.1</b>	<b>3.9</b>	<b>3.0</b>
Egyptian Vulture	0.0	0.0	<b>1.5</b>	0.7	<b>2.5</b>	<b>3.5</b>	<b>6.9</b>	<b>1.6</b>	<b>1.8</b>	<b>1.2</b>	<b>2.1</b>	<b>2.0</b>	<b>4.1</b>
Levant Sparrowhawk	0.0	0.0	0.2	0.0	0.1	<b>1.3</b>	<b>68.6</b>	<b>31.5</b>	<b>14.2</b>	0.0	0.0	0.0	0.0
Honey Buzzard	0.0	0.0	0.4	0.5	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1
Steppe Buzzard	<b>1.0</b>	0.9	<b>7.1</b>	<b>1.4</b>	<b>6.1</b>	<b>4.4</b>	<b>2.6</b>	0.5	<b>3.2</b>	<b>5.2</b>	<b>5.5</b>	<b>3.9</b>	<b>2.1</b>
Long-legged Buzzard	0.8	0.5	1.0	0.0	0.0	<b>4.2</b>	0.0	0.4	0.8	0.0	<b>3.1</b>	0.0	0.4
Steppe Eagle	0.3	0.4	<b>1.1</b>	0.7	<b>2.0</b>	0.9	<b>2.6</b>	0.3	0.8	0.4	<b>1.0</b>	<b>4.9</b>	<b>4.3</b>
Lesser Spotted Eagle	0.1	0.1	0.2	0.0	0.1	0.1	0.7	0.0	0.2	0.1	0.1	0.7	0.7
Short-toed Eagle	0.0	0.6	0.6	0.2	0.9	0.6	0.8	0.3	0.3	<b>1.2</b>	0.0	0.5	<b>1.3</b>
Booted Eagle	<b>1.0</b>	0.4	<b>6.0</b>	<b>2.9</b>	<b>3.1</b>	<b>2.2</b>	<b>5.0</b>	<b>2.2</b>	0.0	0.3	0.8	0.6	<b>1.4</b>
Common Crane	<b>2.0</b>	<b>2.1</b>	0.8	0.2	<b>2.1</b>	0.7	<b>16.2</b>	<b>8.9</b>	0.0	0.7	0.0	0.1	0.9

Species	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12	S13
White Pelican	0.0	0.0	<b>5.1</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.8
White Stork	<b>6.7</b>	0.7	<b>1.6</b>	<b>4.9</b>	0.0	0.0	<b>63.0</b>	<b>5.3</b>	<b>2.3</b>	<b>2.2</b>	<b>6.8</b>	<b>1.9</b>	0.0
Black Stork	<b>1.7</b>	<b>16.9</b>	<b>12.9</b>	<b>1.2</b>	0.0	<b>2.7</b>	0.0	0.1	0.0	0.0	<b>5.8</b>	<b>4.8</b>	<b>5.2</b>
Black Kite	<b>2.3</b>	0.8	0.1	<b>1.0</b>	0.5	<b>3.7</b>	<b>2.9</b>	0.2	<b>1.5</b>	<b>5.1</b>	<b>1.9</b>	<b>8.7</b>	<b>7.2</b>
Egyptian Vulture	0.6	<b>4.6</b>	<b>1.4</b>	<b>2.1</b>	0.7	<b>1.3</b>	0.8	0.0	0.7	0.0	0.0	0.0	0.0
Levant Sparrowhawk	0.0	<b>8.8</b>	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<b>9.6</b>	0.0	0.0
Honey Buzzard	0.3	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.5	0.0	0.0
Steppe Buzzard	<b>2.0</b>	<b>1.5</b>	<b>5.1</b>	<b>2.6</b>	0.3	<b>3.8</b>	<b>5.0</b>	<b>1.8</b>	<b>1.2</b>	<b>1.5</b>	<b>2.7</b>	<b>1.5</b>	0.6
Long-legged Buzzard	<b>1.2</b>	<b>7.2</b>	<b>1.0</b>	<b>2.4</b>	0.0	<b>1.9</b>	<b>1.5</b>	<b>1.4</b>	<b>2.2</b>	<b>1.4</b>	0.4	0.0	0.4
Steppe Eagle	<b>3.7</b>	<b>7.8</b>	<b>2.9</b>	<b>2.2</b>	0.5	<b>1.0</b>	<b>4.7</b>	<b>1.9</b>	<b>1.3</b>	<b>1.5</b>	0.7	<b>1.9</b>	<b>3.7</b>
Lesser Spotted Eagle	0.0	0.8	0.1	0.1	0.0	0.2	0.2	0.2	0.4	0.2	0.1	0.0	0.1
Short-toed Eagle	0.4	0.4	0.8	0.2	0.0	<b>1.2</b>	0.9	0.9	<b>2.6</b>	0.8	0.5	0.4	0.2
Booted Eagle	0.8	<b>2.3</b>	0.0	<b>5.3</b>	<b>1.9</b>	<b>1.2</b>	<b>3.3</b>	<b>1.6</b>	<b>1.6</b>	0.0	<b>1.1</b>	0.4	0.0
Common Crane	<b>4.6</b>	<b>15.3</b>	<b>2.7</b>	<b>2.4</b>	<b>6.5</b>	<b>1.6</b>	0.4	<b>1.3</b>	<b>5.3</b>	<b>8.5</b>	0.0	0.0	0.0

Supplementary material 9. Percentage of the flyway population of the central 90% of migrating birds flying within 200 m of the ground and within a radius of 2.5 km of the observation sites. (Details in Methods). The observations were performed in the desert at Zait Bay in the time period between the February 20 and May 6 2007.

Species	M01	M02	M03	M04	M05	M06	M07	M08	M09	M10	M11	M12	M13
White Pelican	0.0	0.0	0.0	<b>1.4</b>	<b>3.6</b>	0.0	0.0	0.0	0.0	<b>3.4</b>	0.0	0.0	0.0
White Stork	0.0	<b>2.3</b>	<b>2.0</b>	<b>5.8</b>	0.1	<b>3.5</b>	<b>8.6</b>	<b>2.1</b>	0.9	0.7	0.0	0.0	<b>1.4</b>
Black Stork	0.1	0.1	0.8	<b>1.7</b>	0.0	0.0	0.1	0.3	0.0	0.1	0.0	0.0	0.0
Black Kite	<b>1.3</b>	0.2	0.6	<b>1.0</b>	<b>4.0</b>	<b>2.2</b>	0.9	0.8	<b>1.1</b>	<b>1.5</b>	0.0	<b>1.2</b>	0.3
Egyptian Vulture	0.0	0.0	0.0	0.0	0.6	0.0	<b>1.4</b>	0.5	<b>1.2</b>	<b>1.2</b>	0.0	0.0	0.0
Levant Sparrowhawk	0.0	0.0	0.0	0.0	0.0	<b>1.3</b>	0.0	<b>12.5</b>	<b>14.2</b>	0.0	0.0	0.0	0.0
Steppe Buzzard	0.5	0.5	<b>2.8</b>	0.3	<b>4.9</b>	<b>2.3</b>	0.8	0.4	<b>2.7</b>	<b>4.5</b>	<b>1.3</b>	0.9	0.5
Long-legged Buzzard	0.0	0.5	<b>1.0</b>	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Steppe Eagle	0.1	0.3	0.6	0.1	0.1	0.3	0.2	0.2	0.1	0.2	0.2	0.2	<b>1.1</b>
Booted Eagle	0.3	0.0	<b>2.6</b>	<b>1.0</b>	0.0	0.4	<b>1.5</b>	0.4	0.0	0.3	0.0	0.0	0.3
Common Crane	0.0	<b>2.1</b>	0.1	0.2	0.0	0.6	0.0	<b>2.9</b>	0.0	0.7	0.0	0.1	0.0

Species	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12	S13
White Pelican	0.0	0.0	<b>5.0</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
White Stork	<b>1.2</b>	0.4	<b>1.6</b>	0.2	0.0	0.0	<b>5.5</b>	<b>3.8</b>	<b>2.3</b>	<b>1.1</b>	<b>2.2</b>	<b>1.9</b>	0.0
Black Stork	0.8	<b>8.2</b>	<b>8.4</b>	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<b>4.8</b>	<b>5.2</b>
Black Kite	<b>2.1</b>	0.8	0.1	0.7	0.5	<b>2.1</b>	<b>1.0</b>	0.1	<b>1.4</b>	<b>5.1</b>	<b>1.8</b>	<b>8.5</b>	<b>7.2</b>
Egyptian Vulture	0.0	<b>2.0</b>	0.7	0.0	0.7	0.0	0.8	0.0	0.7	0.0	0.0	0.0	0.0
Levant Sparrowhawk	0.0	<b>8.8</b>	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.6	0.0	0.0
Steppe Buzzard	<b>1.1</b>	0.9	<b>2.8</b>	<b>1.5</b>	0.3	<b>1.1</b>	<b>1.8</b>	0.7	0.9	<b>1.3</b>	<b>1.3</b>	<b>1.5</b>	0.6
Long-legged Buzzard	<b>1.2</b>	0.5	0.5	<b>1.0</b>	0.0	<b>1.9</b>	0.5	<b>1.4</b>	<b>2.2</b>	<b>1.4</b>	0.4	0.0	0.4
Steppe Eagle	0.1	0.5	0.3	<b>1.0</b>	0.5	0.2	<b>1.2</b>	<b>1.1</b>	0.2	0.4	0.2	0.0	0.0
Booted Eagle	0.4	<b>1.5</b>	0.0	0.8	0.9	0.4	0.0	0.4	<b>1.2</b>	0.0	<b>1.1</b>	0.4	0.0
Common Crane	0.6	0.0	0.5	0.1	<b>6.5</b>	0.6	0.0	<b>1.3</b>	<b>5.3</b>	0.0	0.0	0.0	0.0