

VHF radio-telemetry monitoring of satellite tracked migrating Black Storks (*Ciconia nigra*) across the Straits of Gibraltar

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ABSTRACT - This report analyzes the results of several years of Black Storks counting across the Straits of Gibraltar. During 1998, we had Czech birds with VHF and Argos satellite tracking. In 1999 we also tracked both Czech and "Cigognes sans frontières" programmes Black Storks. Other tagged birds were also tracked. The Straits of Gibraltar is the most important migration route for the population of western european birds.

Introduction

The migration of birds has always remained a great mystery to mankind. It is only in recent years, through the ringing and recuperation of rings, that we have gained more knowledge about their movements, migration, wintering areas, lifespan... Thanks to the latest techniques of tagging or fitting birds with satellite and VHF transmitters, we now have very accurate information not only about their migratory pattern and behaviour but also about the exact wintering areas and breeding grounds that they reach after their long and precarious journey. Added informations from the satellite show us the length of their journey, stopovers for resting and the distance travelled daily.

Black Storks (*Ciconia nigra*) from western Europe use the Straits of Gibraltar for their crossing of the stretch of water that separates Europe and Africa, making it one of the most important migration routes, together with the Bosphorus for the eastern population.

A small group of ornithologists has, since 1994, been continuing the work started by Cesar San Segundo, collecting data and counting the num-

ber of Black Storks crossing the Straits of Gibraltar during the postnuptial migration from August to October (Table 1).

Table 1 - Postnuptial Black Stork migration across the Straits of Gibraltar. Crossing birds. - Nombres de Cigognes noires traversant le détroit de Gibraltar lors de la migration postnuptiale.

Year / Année	Number / Nombre
1993	943
1994	986
1995	1358
1996	1707
1997*	1469
1998*	1141
1999	986

*Data from MIGRES Project.

Table 2 - Date of crossing by Black Storks with transmitters. - Dates de passage des Cigognes noires porteuses d'émetteurs.

	Black stork	Observatory	Hour	Remarks
16/9/1999	Dominika ¹	Gibraltar	13:30 - 13:45	
17/9/1999	Maria ²	Algarrobo	09:30 - 09:45	Signal also at Cazalla from 09:30 to 10:24
	Valerie ²	Algarrobo	09:30 - 10:24	Signal also at Cazalla from 09:30 to 10:24
18/9/1999	Naussica ²	Algarrobo	09:55 - 10:03	
			10:35 - 12:07	Randomly signals until 15:36
20/9/1999	Martha ²	Algarrobo	15:30 - 15:50	
21/9/1999	Julien ²	Algarrobo	08:35 - 08:45	
	Marie ²	Algarrobo	09:15 - 09:40	
	Aube ²	Algarrobo	09:35 - 09:51	
28/09/1999	Luis ²	Cazalla	14:44 - 15:05	
29/9/1999	Carol ²	Algarrobo	08:40 - 11:00	
	Krystof ¹	Algarrobo	13:38 - 14:10	Probably crossed through Gibraltar
30/9/1999	Johanna ²	Algarrobo	11:45 - 14:40	
	Lisa ²	Algarrobo	11:45 - 14:40	

¹ Belongs to Africka Odysea Project ² Belongs to Cigognes sans Frontières Project

During the 1995 count, we managed to spot two birds carrying transmitters on their back. After contacting several organizations - specially ADE-NEX - we traced these birds' country origin. One was a juvenile Belgian bird (which perished near Fez, Morocco), the other one was an adult female from the Czech Republic. They belonged to two projects "Cigognes Sans Frontières" from France, Belgium and Luxembourg and "African Odyssey" from Czech Republic, whose veteran stork "Krystina" made the crossing as far as we can establish, over eight times before meeting her end in Senegal in 1999. During 1998, we managed to track two birds with transmitters.

Methodology

Observers waited in two traditional stations for sighting passing birds. When a Black Stork was observed then a manual scan between the preset frequencies was taken.

Receiving equipment include a fixed antenna (Diamond 2.7m 5/8CP22E), two scanners (AOR 8000), and two car antennae.

The duration of the study was 17 days, from September 13 to October 4. There was a total of 102 hours coverage at an average of ten hours per day.

Results

In 1999, due to improved equipment and support from volunteers, we were able to track fourteen storks (Table 2). Out of six Czech birds, two crossed the Straits and twelve of the "Cigognes Sans Frontières" storks made the crossing. Each bird had to be scanned through all the frequencies as some birds, like those from Belgium, had problems with the Argos satellites transmitters and no location was received. Only VHF devices worked correctly.

The stations used were : Algarrobo in the eastern sector and Cazalla in the western sector. Depending on the prevailing winds (Table 3) and climatic conditions, one or the other was used (Fig. 1). There was also a station at the top of the Rock of Gibraltar and Hermanillas. They were used on several occasions.

Table 3 - Number of birds crossing at each observatory depending on wind direction. - Nombres de cigognes traversant aux différents observatoires, selon la direction du vent.

	Algarrobo	Cazalla	Gibraltar	Sum
East/Est	175	6	0	181
West/Ouest	374	2	21	397

Also noted were the meteorological conditions, single and groups of birds, routes taken, time and duration of signals. The total numbers of storks seen was 986 (Table 4).

The strength and the direction of winds are the main factor determining how, where and when the birds decide to set off to their journey towards Africa.

Over the numbers of years that we have been involved with counts throughout the day of storks crossing the Straits, we have noticed that

when a spell of improved weather conditions sets in, storks suddenly make their crossing over the stretch of water to the Moroccan coast. If their attempt of crossing fails, they usually make for the hinterland, having exhausted that day's possibilities and usually wait until the following morning before trying again.

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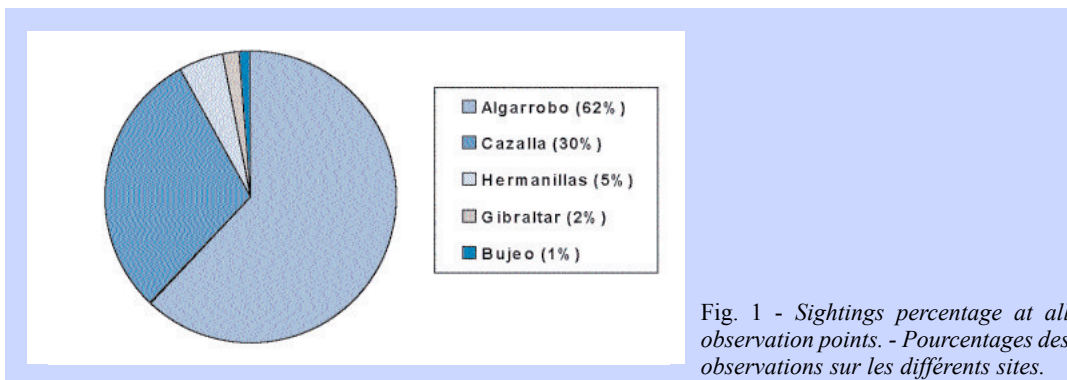


Fig. 1 - Sightings percentage at all observation points. - Pourcentages des observations sur les différents sites.

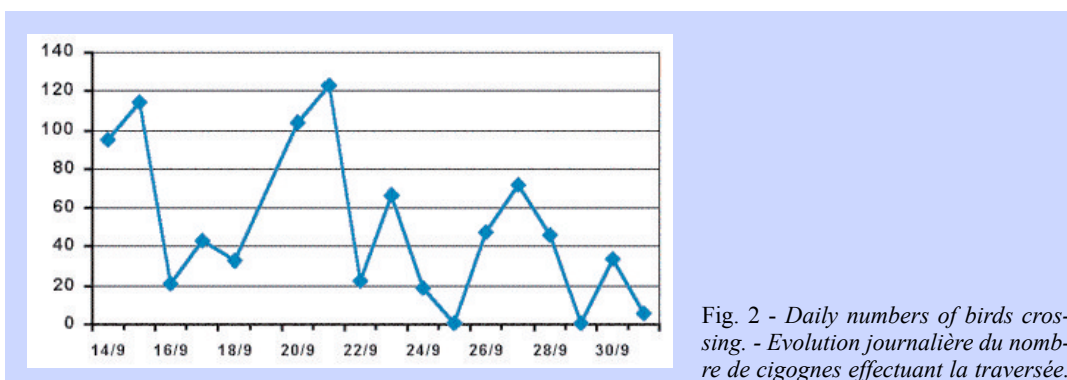


Fig. 2 - Daily numbers of birds crossing. - Evolution journalière du nombre de cigognes effectuant la traversée.

Table 4 - Sightings of birds at each observatory. - Observations effectuées sur les différents sites.

	Algarrobo	Cazalla	Gibraltar	Hermanillas	Bujeo	Sum day
13/9/1999	27	109	.	.	.	136
14/9/1999	17	78	.	.	.	95
15/9/1999	110	4	.	.	.	114
16/9/1999	.	.	21*	.	.	21
17/9/1999	41*	2*	.	.	.	43
18/9/1999	33*	.	.	.	.	33
20/9/1999	104*	.	.	.	.	104
21/9/1999	123*	.	.	.	.	123
22/9/1999	23	.	.	.	.	23
23/9/1999	67	.	.	.	.	67
24/9/1999	19	.	.	.	.	19
25/9/1999	1	.	.	.	.	1
26/9/1999	.	.	.	48	.	48
27/9/1999	8	51	.	.	13	72
28/9/1999	1*	.	.	.	.	1
30/9/1999	34*	.	.	.	.	34
4/10/1999	.	6	.	.	.	6
Sum	608	296	21	48	13	986
*Including Black Stork with transmitter (see Table 2)						

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Suivi radio-téléométrique de la migration de la Cigogne noire (*Ciconia nigra*) au Détroit de Gibraltar.

Depuis 1994, un petit groupe d'ornithologues poursuit le recensement des Cigognes noires (*Ciconia nigra*) traversant le Détroit de Gibraltar durant la migration post-nuptiale, d'août à octobre (Tableau 1).

En 1995, deux oiseaux équipés d'un émetteur dorsal ont été notés. L'un d'eux était un juvénile né en Belgique (qui périra plus tard dans la région de Fès au Maroc), l'autre une femelle adulte originaire de la République tchèque. Ils faisaient partie des projets "Cigognes sans Frontières" pour la Belgique, la France et le Luxembourg, et "Africka Odysea" pour la République tchèque, dont la cigogne emblématique "Krystina", qui a effectué la traversée au moins huit fois, avant de périr au Sénégal en 1999. Durant l'année 1998, deux oiseaux équipés d'émetteurs satellites ont été suivis.

Les recensements sont faits à partir de deux stations traditionnellement utilisées pour l'observation des oiseaux : Algarrobo dans le secteur oriental et Cazalla dans le secteur occidental. En fonction des conditions climatiques, l'une ou l'autre était fréquentée. Une station au sommet du rocher de Gibraltar et à Hermanillas ont également été utilisées à plusieurs occasions. Lorsqu'une Cigogne noire est observée, un scanning manuel est effectué entre les différentes fréquences présélectionnées afin d'identifier l'indi-

vidu grâce à la fréquence de son émetteur. L'équipement de réception comprend une antenne fixe, deux scanners et deux antennes de voiture.

La durée de l'étude s'étend sur 18 jours, du 13 septembre au 4 octobre.

En 1999, grâce à l'amélioration de l'équipement et à l'aide de bénévoles, 14 cigognes (Tableau 3) ont pu être suivies. Deux oiseaux tchèques sur les six identifiés ont effectué la traversée du détroit, de même que 12 oiseaux du programme "Cigognes sans frontières". Un total de 986 oiseaux fut noté durant cette saison-là (Tableau 2).

Les auteurs ont également compilé des données sur le caractère grégaire des oiseaux, les routes empruntées, le temps et la durée des signaux, et les conditions météorologiques.

La force et la direction des vents sont les facteurs principaux influençant le lieu, le moment et la manière dont les oiseaux se lancent pour leur voyage vers l'Afrique. Si les tentatives de traversée échouent, les oiseaux se replient à l'intérieur des terres et attendent habituellement le lendemain matin avant d'essayer à nouveau.