BioOne COMPLETE

Satellite-Tracking Migrating Juvenile Purple Herons Ardea purpurea from the Camargue Area, France

Authors: Jourdain, Elsa, Gauthier-Clerc, Michel, Kayser, Yves, Lafaye, Murielle, and Sabatier, Philippe

Source: Ardea, 96(1) : 121-124

Published By: Netherlands Ornithologists' Union

URL: https://doi.org/10.5253/078.096.0114

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

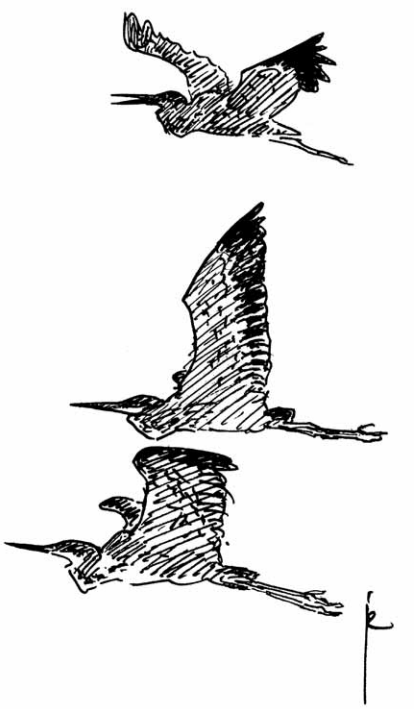
Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://bioone.org/journals/Ardea on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Satellite-tracking migrating juvenile Purple Herons *Ardea purpurea* from the Camargue area, France

Elsa Jourdain[1,2,3,*], Michel Gauthier-Clerc[2], Yves Kayser[2], Murielle Lafaye[4] & Philippe Sabatier[3]



Jourdain E., Gauthier-Clerc M., Kayser Y., Lafaye M. & Sabatier P. 2008. Satellite-tracking migrating juvenile Purple Herons *Ardea purpurea* from the Camargue area, France. Ardea 96(1) : 121–124.

Migratory movements of juvenile Purple Herons from the Camargue area in France were studied by satellite-tracking. Six juvenile birds were fitted with transmitters in early July 2004. Of these six, four successfully started migration in September. Tracked birds followed a western migratory route, heading out south-south-west, towards Spain, the Balearic Islands and then Algeria. They pursed their flight either south-west to the Moroccan Atlantic coast or straight to Mauritania, flying over the Sahara desert. Flight speed could be estimated for one of the birds and was about 40 kilometres per hour. The results of this study are consistent with previous ring recovery data and provide additional knowledge on the speed and departure date of juvenile Purple Herons during autumn migration.

Key words: Purple Heron, satellite-tracking, migration routes, autumn migration, Camargue

[1]Section for Zoonotic Ecology and Epidemiology, Department of Biology and Environmental Science, Barlastgatan 11, Kalmar University, SE-291 82 Kalmar, Sweden; [2]Centre de Recherche de la Tour du Valat, Le Sambuc, F-13200 Arles, France; [3]Unité EPSP-TIMC, UMR 5525, Ecole Nationale Vétérinaire de Lyon, 1 avenue Bourgelat, F-69280 Marcy l'Etoile, France; [4]CNES, French Space Agency, 8 Avenue Edouard Belin, F-31401 Toulouse Cedex 04, France;
*corresponding author (Elsa.Jourdain@hik.se)

Introduction

The Purple Heron *Ardea purpurea* is a colonial migratory species, which is highly sensitive to disturbance and breeds predominantly in reed marshes. Because reed marshes are scarce habitats, the breeding distribution of Purple Herons is very patchy and the species is considered one of the most vulnerable herons in Europe and the Mediterranean region (Hafner 2000, Marion *et al.* 2000). In France, most individuals breed on the Mediterranean coast where the population size was about 800 pairs in 2004 (B. Poulin & Y. Kayser, unpubl. data). Aerial surveys revealed large annual fluctuations in numbers breeding in the Camargue, with a steep decline from 1982 to 1994 and a further decline between 1996 and 2000 (Hafner *et al.* 2004). Anthropogenic changes of the breeding sites, such as reed harvesting and water management practices, have led to low water levels in spring and probably explain part of the observed inter-annual variation (Barbraud *et al.* 2002).

Downloaded From: https://bioone.org/journals/Ardea on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Because the Purple Heron is migratory, its population size may also be affected by conditions encountered in wintering areas or at stopover places during migration. Several studies showed that the breeding populations of Purple Herons in Europe are influenced by the amount of rainfall in sub-Saharan Africa (Den Held 1980, Cavé 1983, Barbraud & Hafner 2001), but considerations of exactly how wintering conditions affect survival is hampered by our scant knowledge of their distribution and habitat on wintering grounds. Thanks to ring recoveries, the French populations are believed to use three different migratory routes (i.e. south-west towards Spain, south-east to Italy, and eastwards along the Po River towards the Adriatic Sea), and to predominantly winter south of 10°N in West Africa (Voisin 1996). However, further research is needed on the distribution, habitat use, winter mortality, and environmental limiting factors in the wintering range (Kushlan & Hancock 2005).

To gather complementary information on the stopover places and wintering quarters of Purple Herons from southern France, we equipped six juvenile birds with Argos transmitters during the spring 2004. We were also aiming to determine whether juvenile birds migrate back to Europe in spring or spend their first summer in Africa, as has been suspected (Voisin 1996).

Methods

Satellite transmitters (numbered 942 to 947) were fitted on 2 July 2004 on six juvenile Purple Herons from a single breeding colony in the Camargue area (43°30'N, 4°30'E). In order to minimize disturbance at the breeding site, the colony size (42 breeding pairs) and the approximate laying date had been estimated beforehand using aerial photographs, as described previously (Kayser *et al.* 1994, Moser 1986). The birds were captured on the nest and released within 10 minutes, so that the time spent in the heronry did not exceed one hour.

We used 30-g platform transmitter terminals or PTTs (Microwave Telemetry Inc., PTT 100) that we attached as backpacks using flexible Teflon ribbon harnesses. Because we did not plan to recapture the birds, a breakaway link made of biodegradable surgical wire had previously been sewed on each harness, so that the birds would lose the transmitter and the harness after a few months. We scheduled each PTT to transmit for 8h every 1–8 days, with more frequent sampling during times of the year when we expected most long-range movements.

The PTTs were tracked by CLS/Service Argos in Toulouse, France. Locations provided by the Argos system are divided into different classes (labeled A, B, Z and 0–3) depending on validation, number of messages received and location accuracy. The accuracy is supposed to be within 1 km for three classes of locations (1–3), while the accuracy for 0, A, B and Z is unspecified. The high-quality locations represented 13% of our data set, which is close to what was found in other studies (Hake *et al.* 2001). Unless specified, only high-quality locations were used.

Results

Of the six juvenile birds equipped, one faced transmitter failure or died within the first week (943), and a second stopped transmitting in early September (944). The four remaining birds successfully started migration (Fig. 1). One of them (946) seemed to have left the Camargue in late August and spent some time in south-west France near the Spanish border before flying to Algeria in mid-September. The corresponding location classes were low (A and B), which means that less than four signals were received by the satellites, but it is very likely that the locations registered were accurate (Hays *et al.* 2001). Unlike PTTs 942 and 946, location accuracy was high for PTTs 945 and 947 and allowed to assess migration departure dates: PTT 945 and 947 were last detected in the Camargue on 12 and 14 September, and were reported in the Mediterranean Sea north of Oran and Alger on 14 and 16 September. All four birds travelled south-south-west across the Mediterranean Sea, flying over the Balearic Islands (942 and 947) before reaching the Algerian coast near Cherchell, where PTT 945 was registered near the Damous

Downloaded From: https://bioone.org/journals/Ardea on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

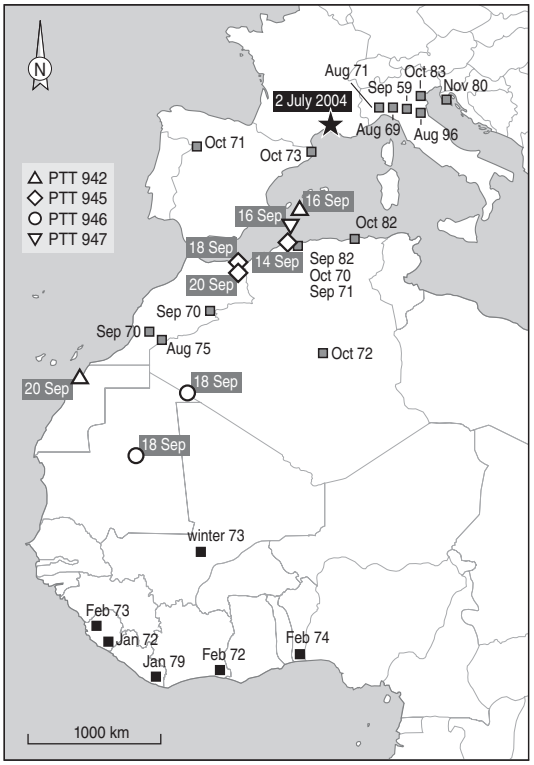


Figure 1. Main dates of detection and corresponding locations of the four Purple Herons equipped with PTTs on 2 July 2004 in the Camargue area (black star). All indicated locations have been obtained with high accuracy (class 1, 2 or 3) except for PTT 942 on 16 September (class A). Ring recovery data (adapted from Voisin 1996) from birds ringed in the Camargue between 1930 and 1982 are indicated (grey square: autumn recovery, black square: winter recovery).

river in Algeria. Then, they pursued their migration south-west towards Morocco or Mauritania (Fig. 1). In Morocco, one bird followed the Moulouya valley, south-east of Melilla: PTT 945 was located north of the river on 18 September and further south on 20, 24 and 26 September. The other bird detected in Morocco (942) was located near the Atlantic coast of Western Sahara on 22 September, south-east of Cape Bojador, about 2 000 km from the place where it had been contacted six days earlier. In contrast, the bird carrying PTT 946 seemed to have chosen another route, over the Sahara desert. On 18 September it was located in southern Algeria, near the Mauritanian border and 16 hours later about 660 km south-west in Ouarane Sands, which means that it was flying with an average speed of about 40 km h^{-1}. All four signals stopped moving between 20 and 24 September (Fig. 2).

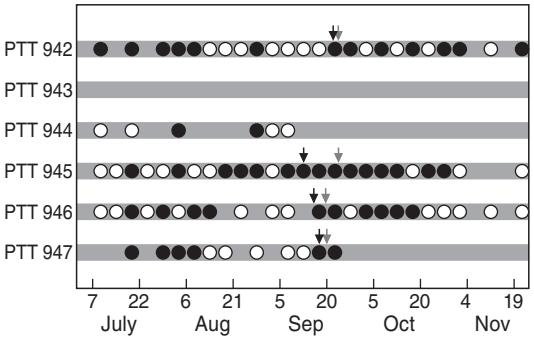


Figure 2. Recording of transmitter locations indicating when at least one highly accurate (black dot) or unspecified (white dot) signal was received within 5-days periods. Black arrows point out when transmitters were first detected with a high-accuracy signal outside of the Camargue and grey arrows when signals stopped moving.

Discussion

All four juvenile birds tracked in this study followed the same migration route, going south-west towards Spain, Algeria, Morocco and/or Mauritania. The results obtained are highly consistent with ring recovery data from birds ringed in western France between 1930 and 1982 (Voisin 1996). Interestingly, transmitters were detected in areas where ringed birds had previously been recovered in spring or autumn before the 1990s (e.g. Balearic Islands, Cherchell area in Algeria, Moulouya valley in Morocco), which suggests that migratory routes have not changed. Because PTTs 942 and 947 were located on the same day south of the Balearic Islands, we may hypothesize that these birds were travelling together, which supports previous observations (Voisin 1996, Kushlan & Hancock 2005).

Downloaded From: https://bioone.org/journals/Ardea on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Unfortunately, migratory movements could not be followed as long as expected. All four signals stopped moving before the birds reached their wintering quarters, indicating either that the birds died or had dropped their transmitter. The latter hypothesis is the most likely as each harness had a breakaway link and all PTTs stopped moving almost simultaneously. This mishap is illustrative of the trade-offs that have to be made when dealing with both research and conservation issues. The data obtained on the first part of migration however allowed to gain information about departure dates and flight speed of juvenile herons and confirmed the western migratory route previously suggested by ring recovery data (Voisin 1996).

We thank Guillaume Paulus and Olivier Pineau for assistance in the field and Adrian Aebischer for relevant advices. We are also very thankful to Anne-Marie Breonce and Christian Ortega from CLS-Argos. This study was financially supported by the French Spatial Agency (CNES) and the French Institute for Research in Agronomy (INRA).

REFERENCES

Barbraud C. & Hafner H. 2001. Variation des effectifs nicheurs de hérons pourprés *Ardea purpurea* sur le littoral méditerranéen français en relation avec la pluviométrie sur les quartiers d'hivernage. Alauda 69: 29–36.

Barbraud C., Lepley M., Mathevet R. & Mauchamp A. 2002. Reedbed selection and colony size of breeding Purple Herons *Ardea purpurea* in southern France. Ibis 144: 227–235.

Cavé A.J. 1983. Purple Heron survival and drought in tropical West Africa. Ardea 71: 217–224.

Den Held J.J. 1980. Population changes in the Purple Heron in relation to drought in the wintering area. Ardea 69: 185–191.

Hafner H. 2000. Herons in the Mediterranean. In: Kushlan J.A. (ed) Heron conservation. Academic Press, London, pp. 33–54.

Hafner H., Pineau O., Kayser Y., Poulin B. & Lefebvre G. 2004. Les ardéidés, hérons, aigrettes et butors, en Camargue. In: Isenmann P. (ed) Les oiseaux de Camargue et leurs habitats: une histoire de cinquante ans 1954–2004. Buchet/Chastel, Tours, pp. 57–120.

Hake M., Kjellen N. & Alerstam T. 2001. Satellite tracking of Swedish Ospreys *Pandion haliaetus*: autumn migration routes and orientation. J. Avian Biol. 32: 47–56.

Hays G.C., Åkesson S., Godley B.J., Luschi P. & Santidrian P. 2001. The implications of location accuracy for the interpretation of satellite-tracking data. Anim. Behav. 61: 1035–1040.

Kayser Y., Walmsley J., Pineau O. & Hafner H. 1994. Evolution récente des effectifs de Hérons cendrés (*Ardea cinerea*) et de Hérons pourprés (*Ardea purpurea*) nicheurs sur le littoral méditerranéen français. Nos Oiseaux 42: 341–355.

Kushlan J.A. & Hancock J.A. 2005. The herons. Oxford University Press, Oxford.

Marion L., P. Ulenaers & J. van Vessem 2000. Herons in Europe. In: Kushlan J.A. & Hafner H. (eds) Heron conservation. Academic Press, London, p. 480.

Moser M.E. 1986. Breeding strategies of Purple Herons in the Camargue, France. Ardea 74: 91–100.

Voisin C. 1996. The migration of Purple Herons (*Ardea purpurea*) ringed in France. Vogelwarte 38: 155–68.

SAMENVATTING

Deze pilotstudie beschrijft hoe de trekbewegingen van jonge Purperreigers, geboren in de Camargue in Zuid-oost-Frankrijk, werden gevolgd met behulp van satelliet-telemetrie. Na het broedseizoen, begin juli 2004, werden zes jonge vogels uitgerust met een tuigje met een satellietzender. De onderzoekers gebruikten afbreekbaar draad om er zeker van te zijn dat het tuigje na een paar maanden zou afvallen. Eén zender viel in de eerste week al uit, terwijl een tweede reeds begin september niet meer werkte. De overige vier gaven een signaal tot de derde week van september en stelden de onderzoekers in staat een groot deel van de trekroute door Zuid-Europa en Noordwest-Afrika te documenteren. De Purperreigers vertrokken tussen 12 en 14 september en volgden een westelijke trekroute. Vanuit de Camargue vlogen ze richting zuidzuidwest via Spanje en de Balearen naar de kust van Algerije. Twee vogels vlogen daarna in zuidwestelijke richting door naar de Marokkaanse kust. Een derde vogel vervolgde zijn trek rechtstreeks over de Sahara en werd het laatst waargenomen in het noorden van Mauritanië. Zijn vliegsnelheid op dit deel van de route was 40 km per uur. Toen de vierde Purperreiger nog in Noord-Algerije was viel de zender uit, gelijktijdig met het stoppen van de zenders van de andere drie vogels. De trekbewegingen van deze vier jonge Purperreigers kwamen overeen met de patronen die uit oudere ringgegevens te herleiden waren. Er wordt daarom geopperd dat de trekroutes de laatste tientallen jaren niet zijn veranderd. (YIV)

Corresponding editor: Yvonne I. Verkuil
Received 6 September 2007; accepted 25 February 2008

Downloaded From: https://bioone.org/journals/Ardea on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use