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NATURAL HABITAT LOSS AND CHANGES IN THE CAMARGUE FROM 1942 TO 1984. WHAT ABOUT THE FUTURE?

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The Camargue is a wetland world famous for its untamed habitats and the symbolic value of some of its landscapes and birds. It benefits from several natural and international measures of protection (National Reserve, Regional Park, Patrimonium List of UNESCO, Ramsar Wetland List, Departmental and Private Reserves). Among its 145,000 ha as a whole, it looks well protected.

Yet a detailed analysis of aerial photographs reveals (Tamisier 1990) big changes in habitats. From 1942 to 1984, 40,000 ha of natural habitats, mostly wetlands, were claimed for agriculture, salt and industry (1,000 ha per year). Today, only 41% of the Camargue's surface (60,000 ha) is still natural, out of which 20,000 ha are actually protected. The remaining 40,000 ha, all in private properties, are under no protection at all and mostly used for hunting, with deleterious effects on habitats and bird populations. So the wetland loss occurs both in quantitative and qualitative terms.

These changes were the right answer of the landowners to the economical rules. In the present situation there are no longer actual risks of extension of agriculture, salt or industry. The near future relies on the uncontrolled development of hunting and tourism which become the most beneficial activities for private owners. The protection of the remaining natural habitats of the Camargue is linked to our capability in elaborating new strategies: these strategies are based on the fact that protection of nature and short term economy are rather antinomic. They should include that moral bodies (e.g. state, EEC) as well as industrial companies in the context of sponsoring, buy or rent private land for protection and education without immediate profit goal.

An unfaithful Curlew Sandpiper?

A. Paul Martin, John D. Uttley & Les G. Underhill

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Curlew Sandpipers *Calidris ferruginea* are generally faithful to their non-breeding sites (Elliott *et al.* 1976; Western Cape Wader Study Group (WSWSG) unpubl. data, APM unpubl. data), as are most other wader species (Evans & Townsend 1988). Therefore, the following observation, though not conclusively demonstrating movement between non-breeding sites in subsequent years, is noteworthy.

On 22 February 1985, APM ringed an adult Curlew Sandpiper at the Swartkops estuary (33° 52' S, 25° 37' E), near Port Elizabeth, Cape Province, South Africa, and on 4 September 1987, this bird was recaptured at Khor Dubai (25° 15' N, 55° 19' E), Dubai, United Arab Emirates, on the southeast shore of the Arabian Gulf (Uttley *et al.* 1988). This represents the first movement of a Curlew Sandpiper between southern Africa and the Arabian Gulf, other recoveries being closer to the Great Circle route lying further to the north, through the Black and Caspian Seas (SAFRING, unpubl. data, Uttley *et al.* 1988). Biometric details taken at the time of ringing and recapture agreed closely (Table 1). Using the means (and standard deviations) for bill-length of Elliott *et al.* (1976) (males 36.8 (1.7) mm, females 40.9 (2.0) mm), the probability that this bird was a male (using the larger bill-length of 37.5 mm) was 0.95.

Compared with average masses in late August and September of 63.9 g in both 1986 (n=53) and 1987 (n=71) for Curlew Sandpipers caught at Khor Dubai, the retrapped bird, with a mass of 80 g on 4 September, was clearly fattening for migration, preparing to move southwards either after completing moult, or perhaps after suspending moult, say, once the sixth primary had finished growing. Three Curlew Sandpipers which had suspended moult were trapped at Khor Dubai: 14 October 1986, $5^{6}0^{4}$, 80 g; 21 September 1987, $5^{6}0^{4}$, 86 g; and

Table 1. Measurements (mm), masses (g) and primary moult scores of Curlew Sandpiper BB46542 (SAFRING) when ringed (first line) and recaptured (second line)

Date	Place	Age	Wing	Bill	Head	Foot	Mass	Moult
22 Feb 1985	Swartkops estuary (33°52'S 25°37'E)	Ad	133	37.0	60.8	53	60	all new

22 September 1987, $5^{7}0^{3}$, 83 g. These masses are below the peak masses of c. 100 g reached when Curlew Sandpipers are preparing for long distance migration (Elliott *et al.* 1976). The number of Curlew Sandpipers at Khor Dubai decreased almost linearly from 2,352 on 27 August 1987 to 855 on 28 September, birds appearing to migrate southwards on completion (or suspension) of moult; few Curlew Sandpipers spend the winter this far north (Uttley *et al.* 1988). Male Curlew Sandpipers depart from the breeding grounds in early July, leaving the females to incubate the eggs and tend the young (e.g. Portenko 1959; LGU pers. obs), peak arrival and passage of adults along the Kenyan coast occurs during August and early September (Pearson & Britton 1980), and many have arrived in South Africa by early September (Elliott *et al.* 1976; Martin & Baird 1987). The date in Dubai, though late, was still plausible for migration to South Africa.

But the fact that it was replacing its sixth primary makes it highly unlikely that it was heading for South Africa. There have been no observations of birds arriving in South Africa having suspended their primary moult (Elliott *et al.* 1976; WCWSG unpubl. data; APM unpubl. data). In September, primary moult in South Africa is just beginning. The most advanced birds with completed primary moult are not observed until December, and moult is, on average, completed early in February (Elliott *et al.* 1976; Dean 1977). Even in east Africa, Pearson (1975) classified the Curlew Sandpiper as a species which arrives with no moult in progress, and starts moult from late September. In north and west Africa, suspension of moult between onward movements occurs occasionally and this appears to be a feature of Curlew Sandpiper populations near the northern limit of their non-breeding range (Pienkowski *et al.* 1976; Elliott *et al.* 1976; Cramp & Simmons 1983). It therefore seems most unlikely that this bird's migration destination was even as far south as east Africa.

The date on which this bird was ringed was after the mean date of completion of primary moult in South Africa, early February, and although there is no proof, it is likely that it moulted at or near the Swartkops estuary during the 1984/85 non-breeding season, where, on 22 February, the breeding plumage was assessed at about one eighth, and the first stages of fattening for northward migration had started.

If the above deductions are correct, the observation seems to suggest that this Curlew Sandpiper changed not only its non-breeding site, but adjusted its moult timing in line with the strategies commonly adopted by birds at two sites near the northern and southern limits of the non-breeding range.

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