The Condor 87:252–255

EARLY SPRING FLIGHTS OF AMERICAN WHITE PELICANS: TIMING AND FUNCTIONAL ROLE IN ATTRACTING OTHERS TO THE BREEDING COLONY

ROGER M. EVANS

AND

KEVIN J. CASH

ABSTRACT.—We observed aerial activities of American White Pelicans (*Pelecanus erythrorhynchos*) at three separate breeding colonies located at East Shoal Lake, Manitoba, Canada, in 1981 to 1983. The onset of flights over a colony occurred 36 ± 2 days before the onset of hatching in the same colony. In each year, flights were concentrated over a single colony on any given day but differed between days. Newly arriving spring migrants were significantly more likely to be attracted to the particular colony over which most of the flights were occurring at the time of their arrival. Our results provide evidence that conspicuous flights serve to attract other pelicans to a currently active colony site, and may thereby facilitate the formation of highly synchronous breeding aggregations in this species.

When American White Pelicans (*Pelecanus erythrorhynchos*) arrive at a breeding site in early spring, they engage in conspicuous flights (Knopf 1979). The ease with which these flights can be detected from ground level by a human observer suggests that they could serve to advertise to other pelicans the location of currently active breeding sites in a manner similar to that suggested for some other colonial birds (Ward and Zahavi 1973). The objectives of our study were to document the occurrence and timing of flights over breeding colonies in early spring and to assess the hypothesis that these flights are attractive to newly arriving migrants.

STUDY COLONIES AND METHODS

We observed pelicans during the breeding seasons of 1981, 1982, and 1983 at East Shoal Lake, Manitoba, Canada (Evans 1972, O'Malley and Evans 1980). Two island colonies, approximately 3 km apart, were present each year. In 1981 and 1982, an additional peninsular colony, approximately 0.5 km from one of the others, was also present.

East Shoal Lake is small (7 × 3 km), the terrain is flat, and trees are absent from the islands and adjacent shoreline. All colonies could readily be observed, with binoculars, from a single point on the south shore, about 2.5 and 3.0 km from the nearest colonies. Verification of activity over the most distant colony, 6 km away, was done when needed from a supplementary shoreline observation point less than 2 km from that colony. It was always possible to determine, without error, over which colony any particular flock was flying.

We began our observations on 12, 15, and 14 of April, 1981, 1982, and 1983, respectively, before the pelicans arrived at the colonies, except for 15 already present at the earliest colony occupied in 1982. Subsequent visits were normally made every three to four days in 1981 and 1982, and every two to three days in 1983. In 1981 and 1982, observations were made near noon, when maximum counts of total numbers of pelicans flying over each colony were recorded. In 1983, observation periods were usually of 4-h duration (range 3–5 h), centered near mid-day. We counted pelicans over each colony every 15 min throughout the observation periods in 1983. We also counted the numbers of pelicans present in individual flocks, mainly about colony 1, during intervals between the 15-min total counts described above. For purposes of analysis, single pelicans were classified as "flocks" of 1.

The openness of the terrain at East Shoal Lake, combined with the locating of our main observation point on the south shore of the lake, enabled us to monitor the destinations of migrants newly arriving from the south during the early phases of breeding activities in 1983. Pelicans flying to and from the foraging grounds in this area fly predominantly in a westerly or easterly direction (O'Malley and Evans 1982); hence, early arrivals from the south were unlikely to be foragers that had already visited the colony. We saw no evidence of departures to the foraging grounds during the first few days following a colony initiation (see also Knopf 1979). This further supports our assumption that we were monitoring new arrivals at the breeding colonies.

To determine the timing of aerial activities in relation to subsequent reproductive events,

TABLE 1. Dates of onset of aerial activities and of hatching for White Pelicans at two (1983) or three (1981, 1982) colonies.

Year	Colony	Nests	(1) onset of aerial activities	(2) onset of hatching	(2) minus (1) interval, days
1981	1	322	15 April ± 2 days[a]	19 May ± 1 day	34
	2	437	23 April ± 2 days	not visited	—
	3	746	27 April ± 2 days	31 May ± 1 day	34
1982	1	577	20 April ± 2 days	28 May ± 1 day	38
	2	623	15 April ± 2 days	23 May ± 1 day	38
	3	256	29 April ± 2 days	3 June ± 1 day	35
1983	1	655	26 April ± 1 day[b]	1 June ± 1 day	36
	2	582	20 April ± 1 day	25 May ± 1 day	35

[a] This date based on observation of apparent incubation initiation on 21 April (see Knopf 1979).
[b] Transient flocks on 20 and 25 April (Fig. 2) that did not stay at the island (see text) were ignored.

we made brief visits to the colonies at about the expected date of hatch. Onset of hatching (±1 day) within an entire colony was taken as an appropriate reproductive event to compare with onset of flights over the same colony.

RESULTS

The earliest flights over the colonies occurred 36 ± 2 days before the onset of hatching. The timing of flight initiation and hatching onset did not appear to be related to absolute colony size (Table 1).

In 1981, flocks were first seen only over colony 1, while colonies 2 and 3 appeared to be totally devoid of pelicans (Fig. 1). Three days later, large numbers were flying over colony 2, a few continued to fly over colony 1, but none were as yet visible over colony 3. The situation had again changed dramatically when the area was next visited, on 28 April, when large numbers were flying over colony 3 and few remained over the other two colonies (Fig. 1). Colony 3 continued to be the most active for the remainder of the season.

The pattern of activity at the colonies in 1982 (Fig. 1) was similar to that described above for 1981, except that colony 2 was the first to be occupied in 1982. In 1983, only two islands were used, but again flights took place primarily over one island, followed by a rapid shift primarily to the other island (Fig. 2). Activity in 1983 differed from the preceding two years in that a second wave occurred at each island, first at colony 2, then at colony 1, late in the season. When this happened (early May), activity again occurred primarily over only one colony on any given day.

Evidence that differential activity over the colonies was associated with differential attraction of newly arriving migrants to the colonies was obtained in 1983. In total, 367 new arrivals went to the colony with the most pelicans flying above it, compared with only 35 new arrivals to the alternate colony ($P < 0.01$; Wilcoxon matched-pairs-signed-ranks test).

Individual flight patterns of many of the arriving birds provided further evidence that new arrivals were being attracted to the colony having the most birds flying overhead. In 1983, colony 2 was the first to be active. This colony lay to the northeast of colony 1; hence, many new migrants from the south passed near colony 1 en route to colony 2. In at least seven different instances, early in the season before colony 1 was active, we observed new arrivals circle, and in three cases land briefly, at colony 1, before going on to colony 2 to join the birds visible there. We interpret these observations to be of birds that were clearly "aware" of the potential of colony 1 for breeding, perhaps because they had nested there in the previous year, but despite this knowledge and the proximity of the colony, they flew on to the more

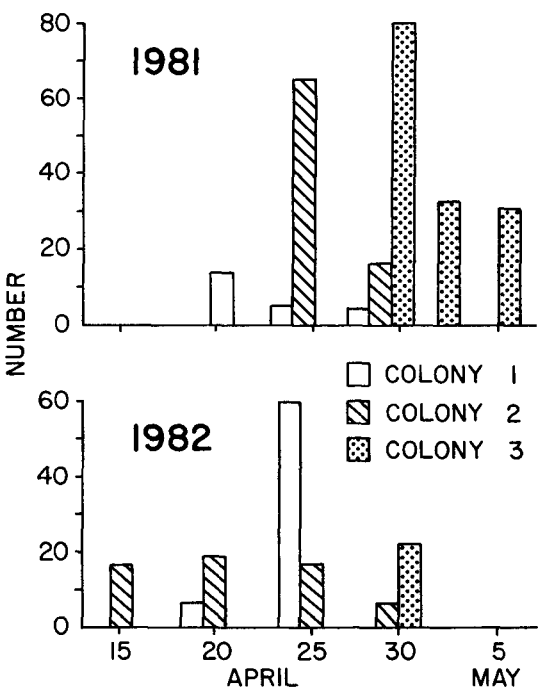

FIGURE 1. Average number of White Pelicans seen flying above the colonies in 1981 and 1982.

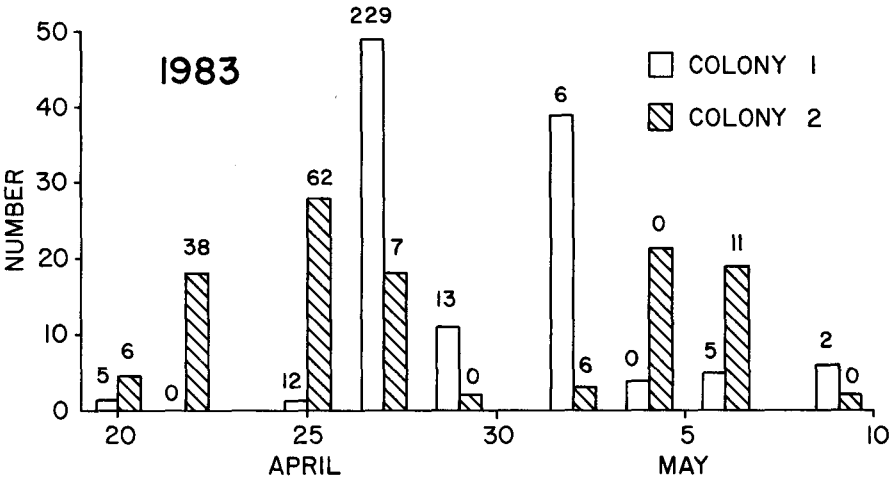

FIGURE 2. Average number of White Pelicans seen flying above colonies in 1983. Numbers above the bars indicate the number of newly arriving migrants attracted to that particular colony on a given day.

distant colony 2 where other pelicans were actively and visibly flying about.

Observations between 10:00 and 15:00 in 1983 showed that arrivals and flock activity occurred throughout the observation period, but were most frequent just before mid-day (new arrivals) or just after mid-day (flocks). At all times, the modal size of individual flocks was two and the mean size consistently just below three (flock size range 1 to 10; Table 2). Flocks larger than two or three were rarely stable.

DISCUSSION

Our results show that American White Pelicans flying above their colony attract other individuals to that site. The most direct evidence was obtained in 1983, when newly arriving migrants repeatedly were seen to join selectively the colony having more pelicans flying overhead. This finding was particularly convincing on those days when pelicans arriving from the south flew close to, and in some instances circled or even landed briefly on, the as yet inactive colony on the south side of the lake, then flew on to the more northerly colony where others were clearly visible as they flew over it. Even in those years when we did not monitor new arrivals, we infer that they too must have gone selectively to the colony having the largest numbers of courting pelicans. This conclusion is indicated because the onset of aerial activities correlated with the onset of large numbers of synchronously hatching young some 36 days later on each of the colonies censused.

One of the effects of new arrivals being attracted to colonies with aerial activities in progress is that birds at a similar stage of the reproductive cycle can settle together in a highly synchronous sub-colony. Such sub-colony synchrony by means of "social attraction" (Hailman 1964, Schreiber and Ashmole 1970) appears to be characteristic of White Pelicans (Knopf 1979). Although social attractions do not necessarily require conspicuous flights over the colony, the apparent attractiveness of such flights to other pelicans seems likely to facilitate the development of sub-colony synchrony in this species. Where more than one breeding island is available, as at East Shoal Lake, the occurrence of conspicuous aerial activities

TABLE 2. Hourly estimates of White Pelicans at East Shoal Lake Manitoba in 1983.[a]

	Time of day				
	10:01–11:00	11:01–12:00	12:01–13:00	13:01–14:00	14:01–15:00
Mean new arrivals/h	0.89	20.14	3.53	3.33	0.41
Hours observed	9	13.75	15	13.5	7.25
Flock size: mean	2.77	2.86	2.56	2.70	2.75
mode	2	2	2	2	2
range	1–5	1–10	1–7	1–7	1–7
Numbers of flocks	30	155	207	146	20
Average number over colony	10.7	13.02	20.68	16.37	14.83
Number of counts[b]	36	55	60	54	29

[a] Average over nine days of observation.
[b] Normally one count every 15 min.

should also reduce the risk that early breeders might fail to attract other synchronized breeders to their breeding site.

According to Knopf (1979), White Pelicans require about 36 days from the initiation of courtship until the hatching of the young. Our finding that the time between the start of flights and the start of hatching at a given colony was 36 ± 2 days (Table 1) is in close agreement with Knopf's findings, and suggests that the pelicans we observed began courtship almost immediately upon arrival at a colony. The peak occurrence of flocking over our colonies was in the hour following the peak of new arrivals in 1983 (Table 2), which is consistent with this interpretation. The modal value of two birds per flock (Table 2) supports the view that the flocks we observed were composed mainly of courting pairs. As in the Australian Pelican (*P. conspicillatus*), it seems appropriate to refer to these activities as "courtship flights" (Vestjens 1977).

Our finding that hatching at a given colony began about 36 days after the start of aerial activities over the same colony suggests that observations of these flights can be used to estimate the date when hatching will begin. This information can be useful to choose the best timing for human visits to a colony to band young or to obtain data on other aspects of pelican biology. American White Pelicans are sensitive to human disturbance (Knopf 1979, O'Malley and Evans 1980, Beaver and Lewin 1981). The use of conspicuous early spring flights to estimate the best time for human visits to colonies should help to minimize investigator disturbance in this species.

ACKNOWLEDGMENTS

We thank Brian O'Malley for his help in the field. This study was supported by operating grants to Evans from the Natural Sciences and Engineering Research Council, Ottawa, and the Manitoba Department of Natural Resources, Wildlife Branch.

LITERATURE CITED

BEAVER, R. D., AND V. LEWIN. 1981. Scheduling censuses of breeding White Pelicans (*Pelecanus erythrorhynchos*) in Northern Alberta. Can. Field-Nat. 95:198–201.

EVANS, R. M. 1972. Some effects of water level on the reproductive success of the White Pelican at East Shoal Lake, Manitoba. Can. Field-Nat. 86:151–153.

HAILMAN, J. P. 1964. Breeding synchrony in the equatorial Swallow-tailed Gull. Am. Nat. 98:79–83.

KNOPF, F. L. 1979. Spatial and temporal aspects of colonial nesting of White Pelicans. Condor 81:353–363.

O'MALLEY, J. B. E., AND R. M. EVANS. 1980. Variations in measurements among White Pelican eggs and their use as a hatch date predictor. Can. J. Zool. 58:603–608.

O'MALLEY, J. B. E., AND R. M. EVANS. 1982. Flock formation in White Pelicans. Can. J. Zool. 60:1024–1031.

SCHREIBER, R. W., AND N. P. ASHMOLE. 1970. Sea-bird breeding seasons on Christmas Island, Pacific Ocean. Ibis 112:363–394.

VESTJENS, W. J. M. 1977. Breeding behaviour and ecology of the Australian Pelican, *Pelecanus conspicillatus,* in New South Wales. Aust. Wildl. Res. 4:37–58.

WARD, P., AND A. ZAHAVI. 1973. The importance of certain assemblages of birds as "information centres" for food-finding. Ibis 115:517–534.

Department of Zoology, University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada. Received 30 April 1984. Final acceptance 19 December 1984.