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Brett K. Bannor

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CONTINUOUS BREEDING BY AMERICAN COOTS IN DADE COUNTY, FLORIDA

BRETT K. BANNOR

*Graduate Program in Landscape Architecture, School of Design,
Florida International University, University Park,
Miami, Florida 33199*

*Present address: Miami Metrozoo, 12400 S.W. 152nd Street,
Miami, Florida 33177*

Abstract.—American Coots (*Fulica americana*) typically exhibit seasonal breeding patterns, raising one or at most two broods per year. This paper describes the unusual breeding cycle of a pair of free-ranging American Coots in the Dade County, Florida, zoological park that hatched six broods between January and November of 1994. Five of the six broods contained at least one chick that survived >75 days. Year-round continuous breeding has not previously been reported for this species. Age of the birds, quality and quantity of food available, and the mild nature of the environment may have contributed to this behavior.

The reproductive biology of American Coots (*Fulica americana*) has been studied extensively, especially in north-central North America (Allen 1985). Published accounts of their breeding ecology in Florida are scarce, although coots with nests or chicks have been recorded throughout the year (Woolfenden 1979, Robertson and Woolfenden 1992). In 1994, I closely monitored a pair of coots that nested near Miami, Florida. These observations revealed that American Coots are capable of continuous breeding in southern Florida.

STUDY AREA

Coots were observed at the waterfowl-flamingo exhibit (henceforth "the lake") at Miami Metrozoo in south Dade County, Florida. This 0.4-ha concrete basin averages 0.7 m deep (range: 0.5 to 1.0 m). Water depth is kept constant year-round. The lake serves as an exhibit for flamingos, waterfowl, and other aquatic birds. The lake also attracts a number of wild birds. Coots are conspicuous visitors, particularly during the winter when as many as 44 individuals have been counted. Few birds remain for the summer, however. Coots first nested at the lake in 1991; one or two pairs have nested every year since.

METHODS

I carefully monitored the nesting activity of a pair of coots (henceforth "the study pair") as I performed my duties as keeper of the lake's captive birds. When their behavior indicated that eggs were being laid, I inspected the nesting area for confirmation. Once a clutch was complete, the nest was checked infrequently until the eggs hatched. After a clutch had hatched, I or my colleagues conducted daily counts of chicks, noting the date on which they were no longer seen.

The pair of coots observed was not marked in any way; however, several lines of evidence suggest that they represented a single pair. First, the open condition of the lake made adults and chicks easy to monitor. Second, the pair nearly always were observed in the same 0.06 ha portion of the lake, and all nests were found along the shoreline of this area. Furthermore, never were more than two adult coots viewed in this section of the lake simultaneously. Third, the small number of coots that remained in the lake through the summer simplified accounting for resident individuals. I censused all coots inhabiting the lake approximately four times a week throughout 1994. From 23 April through 27 June 1994, I viewed only five adult coots on the entire lake; two of these could be distinguished from the study pair by their own unsuccessful attempt to nest in May 1994. Three coots left the lake by 28 June 1994; from that date until 15 October 1994 I counted only two adult coots on the lake. Finally, juvenile offspring of the study pair were tolerated near successive nests and broods, providing a record of continuity. Thus, I am confident that the breeding records described herein represent a single breeding pair.

RESULTS

On 14 January 1994, I discovered a coot nest with three newly hatched chicks and one pipped egg. Based on tarsal color, I determined that both nesting adults were at least four years old (Crawford 1978). Neither adult showed characteristics of the so-called "Caribbean Coot" (Roberson and Baptista 1988).

The study pair produced five additional broods in 1994 (Table 1). Subsequent nests were located <14 m from the first nest in a 15.75 m² section of the lake shore that was dominated by umbrella sedge (*Cyperus alternifolius*).

Five of the six broods had at least one chick that was observed until it was ≥ 75 days old (Table 1). By 75 days, a juvenile coot can fly (Gullion 1954), so I interpreted the absence of a juvenile past this time as evidence that it had fledged and left the area. Thus, the adults reared 8 out of 23 chicks successfully, nearly a 35% success rate.

Hill (1986) described clutch overlap for coots nesting in Washington, wherein a pair would lay a second clutch of eggs a few days before their first clutch was due to hatch. The pair I studied showed a similar laying pattern during their second clutch. On 6 Mar 1994, I inspected their nest; it contained three eggs. Five days later I again checked and found four eggs. I thus assumed that the clutch had been completed with a fourth egg laid on 7 Mar 1994. However, a check on 24 Mar 1994 revealed seven eggs. On 29 Mar 1994 the four original eggs began to hatch. Nearly four weeks later, on 23 Apr 1994, the same nest had

Table 1. Record of continuous nesting by a single pair of American Coots at Miami, Florida Metrozoo during 1994.

Clutch	Date Laying Commenced	Date Hatching Commenced	Interclutch Interval ^a	Clutch Size	Brood Size	Maximum Known Chick Ages ^d				
						1	2	3	4	5
1	≤20 Dec 93	14 Jan 94	N/A	4	4	76	5	5	5	5
2	4 Mar 94	29 Mar 94	48	4+3 ^b	4	12	3	3	3	3
3	8 Apr 94	8 May 94	10	8 ^c	5	92	82	54	28	12
4	8 Jun 94	5 Jul 94	31	5	2	75	23			
5	19 Jul 94	13 Aug 94	14	5	5	>75 ^e	>75	56	50	1
6	≤18 Oct 94	22 Nov 94	76	3	3	>75	>75	1		

^aInterclutch interval is the estimated interval (in days) between hatching of the previous clutch and laying of the first egg in the current clutch.

^bThese 7 eggs were layed in 2 distinct laying sequences (see text).

^cThree unhatched eggs in this clutch may have been left over from the previous clutch.

^dDay after hatching chick was last seen.

^eChicks surviving >75 days were known to have overwintered on the lake.

eight eggs. Because only five of these eight later hatched, it is possible that the three that did not were left over from the second clutch.

DISCUSSION

Gullion (1954) and Arnold (1993) commented on the persistent renesting capacity of American Coots following unsuccessful nesting attempts. However, renesting after successful nesting has infrequently been reported. A number of studies of coot reproduction in the Midwest and in Canada found no evidence of second broods (e.g., Kiel 1955, Fredrickson 1970, Crawford 1980). A few cases of second broods have been noted on the Pacific coast (e.g., Gullion 1954, Hill 1986). A coot pair observed by Gullion produced a third brood, although only one brood resulted in a fledged chick. Year-round continuous breeding, however, has not previously been described in American coots, although it has been noted in two relatives, the Common Moorhen (*Gallinula chloropus*) in South Africa (Siegfried and Frost 1975) and the Purple Gallinule (*Porphyryula martinica*) in Costa Rica (Hunter 1987). Byrd et al. (1985) recorded nesting attempts by the Hawaiian race of the American Coot (*Fulica americana alai*) in every month except October. Because Byrd's study did not follow individual coot pairs, however, it is unclear whether continuous breeding actually occurred.

I believe there are three factors that could have contributed to continuous breeding by the study pair: 1) age of the birds, 2) food abundance, and 3) the benign nature of their environment.

Both members of the study pair were at least four years old. Crawford (1980) noted a significant correlation between age and reproductive success in coots. Although the population he studied produced only one brood per year, older coots (≥ 3 years) nested earlier, laid more and larger eggs, and fledged more young than did younger birds. Similarly, the male coot siring three broods reported by Gullion (1954) was at least 4 years old based on his description of the bird's leg color (cf. Crawford 1978).

Food was readily available to the coots in this study. Green algae were plentiful, and coots were often observed diving and bringing strands of it to the surface for consumption. Because the study pair inhabited a zoo exhibit, they also had access to a reliable supply of commercial waterfowl food and fish pellets provided for the zoo's captive ducks and fish. Hill (1988) found that coots provided with supplemental food laid significantly heavier eggs—but not more eggs—than those that received no supplement. Arnold (1994), however, reported a very weak correlation between supplemental feeding and increased clutch size. In addition, the moorhens that bred year round as described by Siegfried and Frost (1975) received supplemental food intended for the pond's ducks, a situation identical to that reported here.

The abundance of supplemental food may have enabled the coots to occupy a much smaller area than would have been required in a natural setting. Thus, they may have been able to concentrate effort into reproduction that would otherwise have gone into foraging. Because of the definitive boundaries observed by the study pair, I was able to calculate their home range as 0.06 ha. This is an extremely small home range in comparison with other figures from the literature. For example, about 98.5% of the nearly 2,000 pairs of coots Sugden (1979) studied in Saskatchewan apparently had territories larger than 0.1 ha.

Finally, the mildness of this coot pair's environment must be considered. Continuously breeding moorhens in South Africa described by Siegfried and Frost (1975) resided in conditions similar to the lake occupied by the coots in this study. The moorhens' pond was kept filled year-round by irrigation and was located in a warm climate that allowed year-round reproduction. Siegfried and Frost wrote that the moorhen likely "has the propensity for reproducing whenever and for as long as conditions are favourable." Similarly, Arnold (1993) in his study on American Coots in Manitoba, concluded that "re nesting coots are constrained by time or habitat quality, but not by the amount of food or nutrient reserves available for egg production."

Observations I report support Arnold's statement. The pair of coots described here inhabited a lake impervious to drought, in a climate where the lake cannot freeze over, and with a reliable, high quality food source provided unintentionally by man. The coots responded to these benefits by producing young year-round.

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