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PAMELA C. RASMUSSEN AND PHILIP S. HUMPHREY, *Mus. Nat. Hist. and Dept. Systematics and Ecology, Univ. Kansas, Lawrence, Kansas 66045. Received 18 June 1987, accepted 29 Sept. 1987.*

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Male initiation of pair formation in Red Phalaropes.—The mating system of phalaropes has been labeled “female access polyandry” because females compete for and defend males (Emlen and Oring 1977). Males are smaller than females, more cryptically colored, and assume all incubation and brood-rearing duties. All previous studies of phalarope pairbond formation have described females pursuing and courting males (Höhn 1967, 1971; Bengtson 1968; Gillandt 1974; Howe 1975a, b; Kistchinski 1975). In each of these studies, except Gillandt (1974), the sex ratio was one-to-one or female-dominated. In this paper, we present observations on pair formation in the Red Phalarope (*Phalaropus fulicaria*) during a period when extra males occurred in the study population.

We made behavioral observations on Red Phalaropes at Barrow, Alaska, (71°17'N, 156°47'W) from 7 June through 7 July 1975 as part of a study of the mating system and breeding behavior of these birds (Schamel and Tracy 1977 and unpubl.). The main study area (0.67 km²) was a flat, wet sedge marsh with numerous small ponds. Phalaropes were color banded for individual recognition. Behavioral interactions were recorded on tape recorders. We determined the sex ratio in the local population by census counts and by monitoring the sex composition of birds in aerial chases. These two techniques provided independent estimates of the local sex ratio. We found that a male bias in census counts was complemented by a male bias in aerial chases and vice versa (Schamel and Tracy 1977). Although the other studies listed above did not rely upon census data to estimate the sex ratio, data presented in those studies show more than one female approaching and pursuing males and an apparent predominance of females in the local population. Further details of our study area and methods are found in Schamel and Tracy (1977). We observed three pairs during the initial stages (first 24 h) of pairbond formation. In two instances, the female was known to be forming a pairbond with a second male shortly before (one instance) or shortly after (one instance) completing a clutch of eggs for her first mate. All three pairbonds formed during a brief period (10-17 June, see Schamel and Tracy 1977) when males outnumbered females in the study area. All three pairs produced clutches.

We observed a reversal of the courtship roles previously reported for phalaropes. Males aggressively competed for access to females. This was most clearly seen as we observed a female in transition between successive mates. While this female was associating with her first mate, other males approached the pair but were repelled by aggressive acts by the paired male or dissuaded by "pushing" (Bengtson 1968), a nonaggressive behavior displayed only between paired birds. The pushing display identifies birds who are unavailable for pairing and reduces aggression between paired birds and mate-seeking conspecifics. All encounters between the pair and other males were brief (less than a minute). Subsequently, this female's mate went to the nest (three of the final four eggs were present), where he remained most of the day, incubating the eggs. Within 15 min of his departure, the female was approached by several lone males. She was continuously involved in aerial chases with one to three males for the next 17 min, when the group was lost from view. As the males walked towards her, she flew, closely followed by the males. When she landed, the males landed near her and overt attacks (Howe 1975b) occurred between the males. The female would fly again within a few seconds of landing, pursued by the males. When we relocated this female 5 h later, she was in the early stages of pair formation (as described later) with a new male, with whom she paired and later produced a clutch.

The status of the pursuing males was not known, but we believe they were chiefly unpaired males. Two banded males were known to be unpaired. A census of the study area the day before this interaction indicated 22 pairs, 15 lone, nonincubating males, one lone, incubating male (incubating males are easily distinguishable by their feeding behavior [unpubl. pers. obs., Ridley 1980]), and two lone females. Aerial chases involving one female and two or more males occurred frequently during, and only during, the time when lone, nonincubating males were observed during the census counts (Schamel and Tracy 1977). In addition, harassment of pairs by conspecifics was chiefly by males at this time and almost entirely by females later in the season, when the operational sex ratio was skewed towards females (Tracy and Schamel, unpubl. data). Some males in aerial chases could have been paired or incubating males seeking copulations with females other than their mates. Our observations of paired birds did show that males occasionally left their mates briefly to join aerial chases or to attempt copulations with other females (Tracy and Schamel, unpubl. data). However, paired and early-incubating males were still numerous after lone, nonincubating males were no longer observed in the census counts, but no aerial chases involving extra males or fights between males associated with these chases were observed. Thus, we believe most of the males observed competing for females were unpaired males seeking mates.

During the early stages of pair formation, the male followed the female closely in all three pairs observed, while the female was more independent in her movements. Females often responded aggressively towards their new mates, exhibiting 28 head forward threats (Howe 1975b), two flying threats (Howe 1975b), and five overt attacks towards new mates during 465 min of observations. Most aggressive interactions (33 of 35 aggressive acts) occurred when the new mate (male) approached to within 0.5 m of the female. When another male approached a pair, the new mate always ($N = 25$) moved closer to the female, which sometimes (8 of 25) resulted in an aggressive response to the new mate. The new mate (male) usually (28 of 35 aggressive acts) responded to aggression from the females by moving a short distance away and sometimes (5 of 35 aggressive acts) showed apparent appeasement behavior (crouching, fluffing feathers, and peeping rapidly). This same vocalization was given by both members of a pair during pushing. In contrast to the relatively high level of female aggression, males of the forming pairs were aggressive towards the female on only one occasion (in retaliation to an overt attack by the female).

Most aggression by new pairs towards other conspecifics was directed by the paired males towards intruding males (seven head forward threats and five flying threats). Other aggressive

interactions were rare: one flying threat by a newly paired male towards another female, one head forward threat by a newly paired female towards another male, and no aggression by the newly paired females towards other females.

These observations show that the sex roles in phalarope pair formation are flexible and may be dependent upon the sex ratio of birds available for pairing. Pair formation is characterized by: (1) aerial chases, with several birds of the same sex initiating the pairbond chasing a single potential mate (Höhn 1967, Bengtson 1968, Gillandt 1974, Howe 1975b, Kistchinski 1975); (2) the initiating bird attempting to remain close to and persistently following the potential mate (Höhn 1967, Gillandt 1974, Howe 1975b); (3) the initiating bird attempting to drive away conspecifics of the same sex (Höhn 1967, 1971; Bengtson 1968; Howe 1975b; Kistchinski 1975); (4) some aggression between the potential pair members, usually by the potential mate towards the initiating bird when the latter approaches too closely (<0.5 m) (Höhn 1967; Howe 1975a, b; Kistchinski 1975); and (5) a gradual acceptance of the initiating bird by the potential mate (Höhn 1967, Gillandt 1974, Howe 1975a).

In all literature cited above, the female was the "initiating" sex during pair formation, and, except for Gillandt (1974), the sex ratio was equal or female-dominated. Our observations show that all of the above roles of sexes in pair formation can be reversed when males outnumber females in the local population, making males the "limited" sex and females the "limiting" sex (Emlen and Oring 1977). These observations demonstrate the extreme behavioral plasticity of individuals, leading to great flexibility in the mating system (Schamel and Tracy 1977).

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DIANE M. TRACY AND DOUGLAS SCHAMEL, *Dept. Biology and Wildlife and Inst. of Arctic Biology, Univ. Alaska, Fairbanks, Alaska 99775. Received 3 June 1987, accepted 15 Oct. 1987.*

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Notes on the foraging behavior of the Zigzag Heron.—The only recent field observations reported for the poorly known Zigzag Heron (*Zebrilus undulatus*) (Hancock and Kushlan, *Herons Handbook*, Croom Helm, London, 1984) are those of Davis et al. (*Condor* 82:460–461, 1981). Here we report on a bird watched intermittently by NJCM for about 13 h between 8 and 30 August 1985 at an oxbow lake with open swamp forest in the Tambopata Nature Reserve (12°49'S, 69°18'W) near Puerto Maldonado, Madre de Dios Department, Peru. Its primaries were slatey-black as described by Blake (*Manual of Neotropical Birds*, University of Chicago Press, Chicago, 1977) and not noticeably blue as shown in Haverschmidt (*Birds of Surinam*, Oliver & Boyd, Edinburgh, 1968). Its posture resembled that shown by Haverschmidt (1968) and Davis et al. (1981) more accurately than that illustrated by Hancock and Kushlan (1984).

Principal periods of activity during the 14 days on which the heron was observed were before 11:00 and between 15:30 and 17:30. On three occasions, the bird was found around midday quietly perched 5–10 m up in a forest tree some 30 m from the water. The bird foraged from branches overhanging the water, from the emergent roots of swamp trees, and while in the water. It hopped along low branches of swamp trees or partly submerged logs moving its tail, apparently for balance. Tail-flicking described by Davis et al. (1981) was frequently seen during feeding bouts but not in their context of nervous preening. During preening bouts, the heron scratched its head directly with its left foot, and flicked its tail a few times.

When the heron saw possible prey it appeared tense and started to flick its tail from side to side. If the prey moved away, the bird relaxed and ceased tail movements. If the prey did not move away, the usual consequence was the adoption of a more horizontal stance on the branch. The neck was gradually extended as the bird leaned forward on its perch preparatory to a diving strike. If the prey was immediately below the bird and the bird was perched more than 0.5 m above the water, the elongated bird would reach a position of hanging head downwards. The tail was then depressed to “clasp” the perch. Thereafter the bird dove at its prey, partially immersing itself in the water. When perched at water level or just above it, the vertical hanging was omitted and the tail was not used as a “clasp.”

On one occasion, the heron stood in a tangle of branches in the bittern-posture and caught flying insects, probably dragonflies (Odonata). Once the bird struck at prey while it was standing in water up to its abdomen. In addition, small prey items were seized by pecking into the water while wading slowly or standing still. During unsuccessful strikes at prey, the bill often impaled dead leaves floating in the water. These were removed by vigorously beating the bill against branches.

Of 15 strikes at aquatic prey, four (26%) were successful. The prey were fish ca 5 cm long (the length of the bill). After capturing a fish, the heron carried it to a perch, manipulated