American White Pelicans Force Copulations with Nestlings

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ABSTRACT.—We observed 56 forced copulation (FC) events in a breeding colony of American White Pelicans (Pelecanus erythrorhynchos) in Saskatchewan, Canada during the 2005 nesting season. All FCs were directed at nestlings ≥21 days of age that were not continuously attended by an adult. The onset of FCs occurred in close synchrony with an unexpected late-season increase in adult copulation attempts. We suggest that FC directed at nestlings is not simply an aberrant and non-adaptive behavior. Rather, copulations with nestlings result from adult male pelicans being inappropriately stimulated to copulate with nestlings when actually seeking copulations with adult females. Received 22 December 2005. Accepted 24 July 2006.

Forced copulation is a behavior used by males of some species as a strategy to fertilize females that would otherwise be unreceptive (McKinney et al. 1983). The proportion of fertilization events gained via forced copulations is likely low (e.g., 2–5%; Dunn et al. 1999), but this behavior is generally considered adaptive and has been reported for several avian orders (e.g., Anseriformes, McKinney et al. 1983; Charadriiformes, Ewins 1993; Passeriformes, Rising and Flood 1998; and Galliformes, Giudice and Ratti 2001). On rare occasions, forced copulation attempts by adults are directed toward conspecific young. We found a small number of reports of adults attempting to copulate with fledged conspecific juveniles (Armstrong 1988, Ewen and Armstrong 2002) and with unfledged chicks (Kinkel and Southern 1978, Besnard et al. 2002). Fledged juveniles may be mistaken for adult females in some species, but there is no obvious adaptive explanation for forced copulations with unfledged chicks. The motivation for forced copulation with unfledged chicks is therefore unclear.

We describe patterns associated with forced copulation attempts on chicks by adult American White Pelicans (Pelecanus erythrorhynchos; hereafter pelicans) in a breeding colony
in Saskatchewan, Canada. To our knowledge, this behavior in pelicans has been reported anecdotally once previously (Schaller 1964) and remains poorly characterized for birds.

METHODS
We observed interactions between adult pelicans and chicks in breeding colonies on two islands in the Last Mountain Lake National Wildlife Area and Migratory Bird Sanctuary in Saskatchewan, Canada (51.1° N, 107.0° W). The islands were shared with breeding colonies of Double-crested Cormorants (Phalacrocorax auritus) and California Gulls (Larus californicus). We estimated there were 1,360 pelican nests on Island A (10.1 ha) and 240 nests on Island B (3.5 ha) from aerial photos taken on 6 June 2005. The islands were 680 and 550 m from shore, and were observed from the mainland using 45× and 30× spotting scopes, respectively. Two observers continuously monitored interactions in fields of view containing similar numbers of chicks for 30 min at a time. We performed two to six observation periods per day with the exception of 15 June 2005 when only a single 30-min session was possible due to inclement weather. We observed the islands for a total of 41.5 hrs between 1 June and 26 July 2005 and recorded all copulation attempts. We defined forced copulations (FC) with chicks as any interaction during which an adult attempted to mount, or actually mounted and copulated with, an unfledged nestling. In all FCs, nestlings appeared to resist the actions of adults by struggling not to be pinned and attempting to escape and/or dislodge the adult during copulation motions. Between 15 June and 5 July 2005, we visited the pelican colony on Island B on 5 days (two to four observers/visit; each visit lasted 12–20 min) to collect regurgitations from chicks as part of a diet study. We visited Island A once for 15 min (three observers) on 5 July 2005 to conduct a disease and mortality survey.

RESULTS
We observed a total of 56 FCs that began on 13 June, peaked on 15 June, and declined thereafter (Fig. 1). FCs were first observed when a large proportion of the chicks were approximately 3 weeks of age and formed pods in which they were not continuously attended by a parent, and continued until chicks were near fledging. We were unable to estimate the total number of adults and chicks involved in FCs over the season because individual birds were not uniquely marked.
However, we were able to distinguish between independent FCs during each 30-min observation session because of our continuous monitoring approach. The number of adults involved in FCs in each observation period ranged from one to three, and the number of targeted chicks ranged from one to five. There were 13 30-min sessions in which a single FC was detected involving one adult and one chick. In 11 sessions we detected multiple FC events (up to a maximum of six) involving two to three adults and two to five chicks. In these sessions, 23% (range 0–67%) of the total FCs in each session were repeated events initiated by the same adults. Similarly, 12% (range 0–33%) of FCs in each session were experienced by the same chick that was targeted several times.

We were able to view and record details of adult behavior in 34 FCs. In the remaining 22 events we were unable to clearly see the behavior of the adults preceding the FC. Of the 34 FC interactions characterized, 12 (35%) involved adults seeking out an isolated chick that was not part of a pod, and violently jabbing and biting it. The adult then forced the chick to the ground and pinned it by the neck or back of the head using its bill, followed by attempted mounting and/or copulation movements lasting approximately 15–30 sec. In 11 of 34 (32%) FCs, adults first actively isolated chicks by disrupting pods using violent bill jabbing. Once a chick was accessible, FCs occurred as described above. Before and/or after 9 of 34 (27%) FCs, adult pelicans appeared to be tending chicks. In these nine cases, adults preened the chicks before pinning them and attempting to copulate and, in some cases, adults continued to preen and/or sun-shade chicks afterwards. In 2 of 34 (6%) instances, we observed an FC followed by the adult feeding the chick. In all cases, chicks visibly resisted adults attempting FCs, struggling not to be pinned, and attempting to dislodge the adult during copulation motions. We were unable to ascertain whether cloacal contact occurred between adults and chicks during any of the observed FC events.

Adult pelicans began initiating copulations with other adults on 17 June 2005 (Fig. 1; n = 20 instances observed). This behavior was unexpected given the colony was well beyond the stage of nest establishment, with more than 90% of nests into the chick-rearing phase and only several small sub-colonies that were late in egg incubation. When the pattern of copulation events was considered separately by island, FCs were split evenly between islands (28/56, or 50% on each island). In contrast, 16 of 20 (80%) of the adult copulation attempts occurred on Island B, compared to only 4 of 20 (20%) on Island A (Fig. 2A, B).

DISCUSSION

Based on a small number (n = 23) of FC observations, Schaller (1964) proposed that movements of nestling pelicans might resemble those of receptive females, thus stimulating sexual behavior in adult males. However, that study provided no quantitative data on FC timing or frequency, and the observations did not permit establishment of any link between FC events and adult copulation behavior. In our study, the similarity in the date of onset of both FCs and adult copulations suggests a relationship between these two behaviors. We postulate that FCs represent adult male pelicans directing inappropriate sexual attention towards nestlings when actually seeking to copulate with adult females. If this is the case, FCs in pelicans can be interpreted as a non-adaptive by-product of potentially adaptive adult copulation attempts, as opposed to simply aberrant behavior. Thus, we expect FC behavior to be widespread in pelican colonies.

It is not clear why some adult pelicans began courtship and copulation attempts, including FCs, at our study site in mid-June. This is well beyond the nest-establishment period on the observed islands where even the latest sub-colonies to begin nesting were at least 3 weeks into egg incubation. Besnard et al. (2002) suggested the high frequency of FC observed in Black-billed Gulls (Larus bulleri) was a direct result of a flooding event that destroyed part of the colony. Nest loss asso-
FIG. 2. Mean frequency of observed copulation attempts by adult American White Pelicans with other adults or with unfledged chicks in (A) a primarily undisturbed colony on Island A, and (B) a colony on Island B at Last Mountain Lake National Wildlife Area and Migratory Bird Sanctuary, disturbed five times between 15 June and 5 July 2005 for collection of diet samples. The data are expressed as the number of attempts per 30-min observation period. Means are based on two to six observation sessions per day; error bars have been omitted for clarity.

Associated with the flood stimulated large-scale and intensive re-nesting, placing nestlings in the colony concurrent with courting and copulating adults. Re-nesting male gulls directed inappropriate sexual attention towards chicks begging for food, which resembles female solicitation in that species. It is therefore possible that disturbance and nest loss may be a prelude to FCs.

In our study, the only disturbances of which we are aware were our five visits to Island B between 15 June and 5 July 2005, and the single visit to Island A on 5 July 2005. FC frequency peaked on 15 June, and most adult
copulations were observed between 17 and 22 June on the more disturbed Island B. This raises the possibility that our research activities indirectly caused the associated FC behavior. On Island B, we documented the loss of 12 of 240 (5%) pelican nests due to depredation of young chicks by California Gulls during our first two visits. By the time we visited Island A, however, all chicks were too large to be at risk of gull predation. It seems unlikely this small level of nest loss and potential re-nesting by the associated adult pelicans can explain the number of FC events we observed. In addition, individual pelicans typically abandon colonies following nest loss rather than attempting to re-nest within a season (Schaller 1964), and it is extremely unlikely that a re-nesting response could be induced so quickly following the first disturbance event. Preliminary observations of three FC events in early June 2005, in the absence of any colony disturbance, support the idea that disturbance is likely not the major cause of the behavior.

An alternative explanation for the sudden appearance of courtship behavior, adult copulations, and FCs in mid-June is the possibility that birds were still attempting to join the colony despite its advanced state, or that non-breeding adults entered the colony to 'practice' copulation. A further point worth considering is that while we have assumed FCs to be instigated by adult male pelicans, Kinkel and Southern (1978) reported forced copulation attempts on chicks by adult female Ring-billed Gulls (Larus delawarensis), suggesting this assumption could be erroneous. We conclude that FCs occur in pelicans and appear to be non-adaptive, and associated with adult copulation activity. The circumstances surrounding the stimulation of FC behavior and the extent to which it occurs in other colonies and other species requires further investigation.

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LITERATURE CITED


