

NOCTURNAL ACTIVITY IN BREEDING OLROG'S GULLS (*LARUS ATLANTICUS*)

Pablo Yorio¹, Nicolás Suárez², Flavio Quintana¹, & Alejandro Gatto¹

¹Centro Nacional Patagónico (CONICET) and Wildlife Conservation Society, Bv. Brown 3500, 9120, Puerto Madryn, Chubut. *E-mail*: yorio@cenpat.edu.ar

²Universidad Nacional de la Patagonia, Bv. Brown 3700, 9120, Puerto Madryn, Chubut.

Actividad nocturna en la Gaviota de Olrog (*Larus atlanticus*).

Key words: Nocturnal activity, Olrog's Gull, *Larus atlanticus*, Patagonia.

INTRODUCCIÓN

Birds have been traditionally considered as being mostly diurnal, with a few groups being characteristically nocturnal in their habits (Martin 1990). Among colonial waterbirds, many species are strictly or regularly active at night (McNeil *et al.* 1992, 1993). Gulls are mostly active during the day (Burger 1988), although at least 18 species have been reported to show nocturnal behavior (Burger & Staine 1993, McNeil *et al.* 1993). Despite the widespread occurrence of nocturnality in colonial waterbirds, few studies have described in detail this behavior (McNeil *et al.* 1993). Particularly for gulls, there is little quantitative data on their nocturnal habits (Burger & Satine 1993, Hébert & McNeil 1999), mostly due to the difficulty of making night observations.

The Olrog's Gull (*Larus atlanticus*) is an endemic species of the Argentine coast which inhabits tidal wetlands in northern and central Patagonia. It has a small population and breeding is restricted to only two nesting

areas separated from each other by 700 km (Yorio *et al.* 1997, Delhey *et al.* 2001a, Rábano *et al.* 2002). Olrog's Gulls are feeding specialists during the breeding season, preying almost exclusively on two intertidal grapsid crab species, *Cyrtograpsus angulatus* and *C. alimanus* (Herrera 1997, Delhey *et al.* 2001b). Due to its restricted range, low numbers, and specialized food requirements, the Olrog's Gull has been internationally considered as "vulnerable" (BirdLife 2000). In this paper, we present information on the nocturnal activity of Olrog's Gull breeding at Golfo San Jorge, Argentina.

METHODS

The study was carried out in a colony of 29 breeding pairs at Isla Vernacci Oeste Noroeste, Caleta Malaspina (45°11'S, 66°30'W), Chubut, Argentina, during the breeding season of 2001. As part of a broader study of the use of foraging areas and feeding behavior of Olrog's Gull, VHF radio-transmitters (Standard model, Advanced Teleme-

try Systems, Bethel, MN) were attached to eight adult birds, one of each pair, captured during the late incubation period (26 and 27 November). The transmitters were fixed using waterproof tape to the two central tail feathers. The procedure was completed in less than 5 min and the released birds flew directly to sea and returned to their nests. Average weight of radio-transmitters was 18.4 g (SD = 0.2, N = 6), which represented approximately 2% of adult body mass (mean = 810 g, SD = 45.5, N = 8 birds). All birds carrying devices continued breeding normally during the study period.

Colony attendance by each individual was recorded automatically, 24 h a day, every 15 min, by a data logger (DCCII model, ATS Inc.) connected to a scanning receiver (R2000 model, ATS Inc.). This equipment was located 5 m from the nests of the studied birds and any radio-tagged bird within a radius of 20 m was recorded, which represented the maximum distance between the equipment and the water's edge. Information was obtained on 28 and 29 November and from 11 to 19 December, totaling 11 complete non-consecutive days, covering the late incubation and early chick stages. Absences from the nest during day observations corresponded to foraging trips, as confirmed by radio telemetry (see Yorio 2004). A nocturnal absence from the colony was defined as that which started during hours of darkness and of which at least 50% of the duration occurred during night hours. The duration of nocturnal absences from the colony was calculated as the time difference between the departure from and arrival at the nest/colony. A mean value of each of the two parameters (number per day and duration of absences) was determined for each individual and means were then pooled to calculate overall mean values.

Each trip was assigned to a category of tide and moon phase. Tide heights during

each recorded absence were obtained from tables and then assigned to three categories (high, mid and low). For the analysis, mid and low tide were grouped, considering that both tide categories offered the gulls the possibility of feeding on exposed intertidal habitats. Tide heights were then related to presence/absence records obtained with the data logger. Results are given as mean \pm 1 SD.

RESULTS

The number of trips per 24 h for the eight individuals was obtained for 11 days, totaling 357 trips. Of the 357 recorded trips, 74 (21%) were made during the night. All birds showed nocturnal activity. The mean number of nocturnal trips per day was 0.8 ± 0.3 (range = 1–3, n = 8 birds). Mean nocturnal trip duration was 99 ± 46 min (n = 8 birds), and did not differ significantly from diurnal foraging trips (105 ± 24 min; n = 8 birds) (Wilcoxon $Z = 0.14$; $P = 0.88$).

Eighty percent of nocturnal trips (n = 74) were made in the absence of moonlight. Ninety one percent of nocturnal trips (n = 74) were made during low or mid tides. Average tide height at night during the study period was significantly lower (36 cm) than that during the day (Mann-Whitney $Z = -3.06$; n = 10, 16; $P = 0.002$).

DISCUSIÓN

This study shows that all radio-tagged Olog's Gulls were active at night, and that more than 20% of absences from the colony occurred during night hours. Absences from the colony were more likely at mid and low tides, when a higher proportion of intertidal crab habitat was exposed. Telemetry data obtained during daylight hours showed that absences from the colony detected with the data-logger corresponded to foraging trips within the Caleta Malaspina (Yorio *et al.* 2004), and the duration

of recorded nocturnal absences was similar to that of diurnal foraging trips. Unfortunately, we were unable to make independent observations of gulls foraging at night, but the observed pattern of absences strongly suggests that Olrog's Gulls were leaving the colony at night to forage.

Except for the Swallow-tailed Gull (*Creagrus furcatus*) which forages exclusively at night during the breeding season (Hailman 1964), gulls are mostly diurnal, and feeding by night takes advantage of moonlight or artificial lights (Watanuki 1986, McNeil *et al.* 1993 and references therein, Arcos & Oro 2002). Nocturnal activity of Olrog's Gulls was recorded during different light conditions, suggesting that they may search for prey even during very dark nights. This study provides information on nocturnal activity in a new gull species, and shows that nocturnal activity is a regular behavior in breeding Olrog's Gull. If gulls are leaving the colony at night for foraging, nocturnal trips could be contributing significantly to the total energy input of breeding individuals. Night foraging has been recorded in marsh birds which are highly dependent on the tidal cycle for feeding, and where daytime feeding may be inadequate to fulfill individual energetic requirements (Morrier & McNeil 1991, McNeil *et al.* 1993, Thibault & McNeil 1994). In addition, low tides at night in this study were lower than those during the day, suggesting more profitable feeding conditions. Further observations are needed to confirm if individual Olrog's Gulls which are away from the colony during the night actually engage in foraging and, if so, explore the selective pressures favoring this nocturnal behavior.

ACKNOWLEDGMENTS

Research was funded by grants from Wildlife Conservation Society, Consejo Nacional de Investigaciones Científicas y Técnicas, and

Agencia de Promoción Científica y Tecnológica. We thank N. Lisnizer, R. Vera, M. A. Díaz, for field assistance. We also thank Centro Nacional Patagónico (CONICET) for institutional support and Soriano S.A. We thank the Dirección de Fauna y Flora of Chubut for research permits.

REFERENCES

- Arcos, J. M., & D. Oro. 2002. Significance of nocturnal purse seine fisheries for seabirds: A case study off the Ebro Delta (NW Mediterranean). *Mar. Biol.* 141: 277–286.
- Burger, J. 1988. Foraging behavior in gulls: Differences in method, prey and habitat. *Col. Waterbirds* 11: 9–23.
- Burger, J., & K. J. Staine. 1993. Nocturnal behavior of gulls in coastal New Jersey. *Estuaries* 16: 809–814.
- Delhey, J. K. V., P. Petracci, & C. M. Grassini. 2001a. Hallazgo de una nueva colonia de la Gaviota de Olrog (*Larus atlanticus*) en la ría de Bahía Blanca, Argentina. *Hornero* 16: 39–42.
- Delhey, J. K. V., M. Carrete, & M. Martínez. 2001b. Diet and feeding behaviour of Olrog's Gull *Larus atlanticus* in Bahía Blanca, Argentina. *Ardea* 89: 319–329.
- Hailman, J. P. 1964. The Galapagos Swallow-tailed Gull is nocturnal. *Wilson Bull.* 76: 347–354.
- Herrera, G. O. 1997. Dieta reproductiva de la Gaviota de Olrog *Larus atlanticus* en la Provincia del Chubut. Tesis de Licenciatura, Univ. Nacional de la Patagonia, Trelew, Argentina.
- Hébert, P. N., & R. McNeil. 1999. Nocturnal activity of Ring-billed Gulls at and away from the colony. *Waterbirds* 22: 445–451.
- Martin, G. 1990. *Birds by night*. Poyser, London, UK.
- McNeil, R., P. Drapeau, & J. D. Goss-Custard. 1992. The occurrence and adaptive significance of nocturnal habits in waterfowl. *Biol. Rev.* 67: 381–419.
- McNeil, R., P. Drapeau, & R. Pierotti. 1993. Nocturnality in colonial waterbirds: Occurrence, special adaptations, and suspected benefits. Pp. 187–246 *in* Power, D. M. (ed.). *Current Ornithology*. Volume 10. Plenum Press, New York,

- New York.
- Morrier, A., & R. McNeil. 1991. Time-activity budget of Wilson's and Semipalmated plovers in a tropical environment. *Wilson Bull.* 103: 598–620.
- Rábano, D., P. García Borboroglu, & P. Yorio. 2002. Nueva localidad de reproducción de la Gaviota de Olrog *Larus atlanticus* en la Provincia de Buenos Aires, Argentina. *Hornero* 17: 105–107.
- Thibault, M., & R. McNeil. 1994. Day/night variation in habitat use by Wilson's Plovers in north-eastern Venezuela. *Wilson Bull.* 106: 299–310.
- Watanuki, Y. 1986. Moonlight avoidance behavior in Leach's Storm-Petrels as a defense against Slaty-backed Gulls. *Auk* 103: 4–22.
- Yorio, P., F. Quintana, A. Gatto, N. Lisnizer, & N. Suárez. 2004. Foraging patterns of breeding Olrog's Gull at Golfo San Jorge, Argentina. *Waterbirds* 27: 193–199.
- Yorio, P., G. Punta, D. Rábano, F. Rabuffetti, G. Herrera, J. Saravia, & P. Friedrich. 1997. Newly discovered breeding sites of Olrog's Gull *Larus atlanticus* in Argentina. *Bird Conserv. Int.* 7: 161–165.

Accepted 30 July 2004.