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THE OLROG'S GULL (*LARUS ATLANTICUS*) ATTENDING HIGH-SEAS TRAWLERS DURING THE BREEDING SEASON

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ABSTRACT.— We report sightings of the Olrog's Gull (*Larus atlanticus*) obtained during observations of the interaction between commercial high-seas trawl fisheries and seabirds off Argentina. In late spring 2009, up to eight individuals (both adult and sub-adult birds) were noted feeding on fishery discard of an ice-trawler operating in waters relative close to the El Rincón estuary, southeast Buenos Aires Province. This is the first record of Olrog's Gull exploiting discards from high-seas fisheries 120 nautical miles off the coastline during the breeding season.

KEY WORDS: *El Rincón estuary, fishery discards, high-seas trawlers,* Larus atlanticus*, Olrog's Gull.*

RESUMEN. LA GAVIOTA CANGREJERA (*LARUS ATLANTICUS*) ASOCIADA A ARRASTREROS DE ALTURA DURANTE LA TEMPORADA REPRODUCTIVA.— En este trabajo se dan a conocer avistajes de la Gaviota Cangrejera (*Larus atlanticus*) obtenidos durante el desarrollo de un proyecto de evaluación de la interacción entre pesquerías de arrastre de altura y aves marinas en aguas argentinas. A fines de la primavera de 2009, ocho individuos (incluyendo aves adultas y subadultas) fueron registrados alimentándose del descarte pesquero de un buque arrastrero fresquero en aguas cercanas al área del frente costero de El Rincón, en el sudeste de la provincia de Buenos Aires. Este es el primer registro de la Gaviota Cangrejera haciendo uso del descarte proveniente de pesquerías de altura a una distancia de 120 millas náuticas de la línea de costa durante la etapa reproductiva.

PALABRAS CLAVE: *arrastreros, descartes, El Rincón, Gaviota Cangrejera,* Larus atlanticus.

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The Olrog's Gull (*Larus atlanticus*) is a species endemic to the Atlantic coast of Argentina (Olrog 1967, Harrison 1983, Yorio et al. 1997). Its breeding range is restricted to only two nesting areas and six breeding colonies along 2500 km of the central Argentinean coast between 39°12'–45°11'S (García Borboroglu and Yorio 2007). The main breeding area of the species is situated in the Bahía Blanca estuary (Delhey and Petracci 2004). The entire breeding population has been estimated in approximately 4000–5000 pairs (BirdLife International 2010). The species is listed as Vulnerable by the International Union for the Conservation of Nature (IUCN) (BirdLife International 2010) and is included in Appendix I of the Convention on Migratory Species given its restricted distributional range, low population size, specialized food requirements, and conservation threats (Yorio and Harris 1992, Yorio et al. 1997, 2005). Hatching occurs in early November and early December in southern Buenos Aires Province and northern Patagonia, respectively (Yorio et al. 2005). Previous studies of the Olrog's Gull diet revealed that breeding individuals feed almost exclusively on grapsid crabs (Olrog 1967, Devillers 1977, Delhey et al. 2001, Herrera et al. 2005). Over 70% of the total breeding population is concentrated in the Bahía Blanca estuary, an area subject to intense human pressures from urban development, industry, agriculture, recreation, fishing, pollution and even egging (Yorio et al. 1997, 2005, García Borboroglu and Yorio 2007). Habitat degradation and human activities such as sports fishing were reported to affect individuals in wintering grounds of southern Buenos Aires Province (Berón et al. 2007, Berón 2009). The species is suspected to be experiencing a gradual declining, but no assessment of the trends of the population exists (BirdLife International 2010).

To date there are few records of *Larus atlanticus* interacting with commercial fishing activities in Argentina. Individuals were observed to feed on fishery discards at the mouth of the Mar del Plata harbour and near the unloading area (Martínez et al. 2000). Large numbers of individuals were also reported feeding in association with fish-meal plants within the harbour (Berón et al. 2007, Berón 2009). However, until now the species has not been recorded in association with coastal and high-seas trawl fisheries (González-Zeballos and Yorio 2006, Favero et al. 2011). Here we report for the first time the Olrog's Gull interacting with commercial fishing vessels in offshore Argentinean waters. These observations were part of an ongoing survey aimed to assess seabird-fisheries interactions in the trawl fishery off Argentina.

METHODS

Seabird occurrence and abundance were systematically recorded onboard the *F/V Virgen María*, a commercial high-seas ice-trawler targeting Argentine hake (*Merluccius hubbsi*) and operating chiefly between 40°33'S, 60°00'W and 41°59'S, 61°15'W from 13 October to 8 November 2009. In general terms, fishers do not process the catch onboard and preserve it in ice within plastic cubes, trips last 4–15 days, vessels operate a minimum of 130–150 days per year and performs some 600 hauls per year. Fishing effort is distributed in the Patagonian Shelf and shelf break between 37–48°S, particularly concentrated between 42–46°S (see Favero et al. 2011). Observations were conducted primarily over the continental shelf (<200 m deep). Overall, 51 hauls were monitored in 15 fishing days.

Species composition and abundance estimations were performed during trawl operations during daylight hours. The counts were made from either the port or starboard side astern of the vessel covering a 200 m radius sampling area (200 m astern and 200 m on the starboard and port sides) (Favero et al. 2011). This provided the least obstructed view of the active fishing activity at the stern of the trawler and also minimized disturbance to fishing operations. At each survey we collect data on seabirds' attendance by means of the strip transect method (see Tasker et al. 1984). All seabirds that entered the designated area (200 m) were counted during 10 min. The 200-m radius was calibrated periodically throughout the day using a range finder.

Autocorrelation between consecutives counts within a species within a day ranged between 0.28–0.63 (all $P < 0.05$). To eliminate this temporal autocorrelation, we calculated the mean count of each species within each haul within each fishing day (where a haul was defined as a complete sequence of trawling followed by haulback and discarding). Although summary tables are based on the complete data set, we used calculated mean values (210 means; without transformation) for analyses that include count data.

The species was identified by its banded bill, the white tail with black sub-terminal band, and the outer primaries that lack the white spots or "mirrors" of those of the Kelp Gull (*Larus dominicanus*) with which it is sometimes confused (see descriptions in Harrison 1983, and Narosky and Yzurieta 2003). For other seabirds, particularly albatrosses (Diomedeidae), we followed the revised taxonomy in Robertson and Nunn (1998).

RESULTS

A total of 15 species were identified attending the vessel during the 131 trawl counts sampled. Adult and sub-adult individuals of the Olrog's Gull were sighted on five different occasions (Table 1). The sightings were concentrated between 16 October and 5 November 2009. Three single gulls were seen but on 3 and 4 November three and two birds were noted, respectively. Individuals that were conspicuous because of distinct plumage were seen only on single days, confirming a high turnover of birds.

The mean distance between the closest colony in the Bahía Blanca estuary and gulls sighted attending the vessel was 120 nautical miles (range: 64–133).

Olrog's Gull individuals were sighted mainly in association with other seabirds, being the Black-browed Albatross (*Thalassarche melanophris*) (frequency of occurrence: 100%, median: 150 individuals, range: 1–278), the Southern Giant Petrel (*Macronectes giganteus*) (76%, 3, 0–30), the White-chinned Petrel (*Procellaria aequinoctialis*) (91%, 18, 0–96), the Cape Petrel (*Daption capense*) (91%, 16, 0–90), the South American Tern (*Sterna hirundinacea*)

Table 1. Date, location, and number of adult and sub-adult individuals of Olrog's Gull (*Larus atlanticus*) sighted in association with a high-seas ice-trawler operating within Argentine jurisdictional waters.

Date	Location	Adults	Sub-adults	Total
16 October 2009	41°29'S, 60°00'W	1		1
25 October 2009	40°47'S, 61°05'W		1	1
3 November 2009	41°21'S, 60°04'W	2	1	3
4 November 2009	41°23'S, 60°00'W	1	1	2
5 November 2009	41°56'S, 60°47'W	1		1

(36%, 4, 0–55) and the Kelp Gull (8%, 19, 0–94), the most common species.

All seabirds were attracted by the discards originated by the fishing operations and were seen to feed on the refuse. In general, Olrog's Gull individuals remained either resting in different sections of the vessel (e.g., wire cable, handrail) or landed on the sea surface astern of the vessel in the vicinity of the discarding area. Although these individuals were often observed feeding upon fishery discards, no bird was ever observed interacting (e.g., colliding) with fishing gear or was incidentally captured.

DISCUSSION

According to our observations, both adult and sub-adult individuals of the Olrog's Gull appear to attend trawlers and exploit fishery discards over 100 nautical miles (or 185 km) away from their colony off the Argentine coastline during the breeding season. This is novel information considering that literature generally refers the species as nearshore and coastal forager during the breeding season. However, Olrog's Gull was seen only infrequently in comparison with other (mostly pelagic) seabird species sighted around the vessel. These low densities may be the result of the small population, but it is also possible that the species could be showing during recent times a shift in its foraging behaviour, taking advantage of an abundant and spatio-temporal predictable food resource such as fishery discards. Currently there is few data with regard to the offshore distribution of the Olrog's Gull, with the only record consisting of a small number of birds observed 10 nautical miles off the Mar del Plata harbour during winter (Olrog 1958). All individuals observed in our study were concentrated in a restricted marine region of the South West Atlantic Ocean (waters close to El Rincón estuary, see Acha et al. 2004), suggesting that at least some individuals may concentrate in this area during the breeding season. Although it has being referred as a seabird specialized in the consumption of crabs, recent observations in line with this study suggest that the Olrog's Gull regularly attend coastal fisheries in wintering grounds of southeast Buenos Aires Province. Between May 2007 and May 2008 Olrog's Gull was the second most frequent and abundant top predator associated with the coastal fleet fishing within 25 nautical miles of Mar del Plata harbour, with up to 78 gulls attending the vessels (Seco Pon, unpublished data).

Several authors suggested that individuals breeding in estuarine habitats feed primarily on crabs (Olrog 1967, Devillers 1977, Delhey et al. 2001, Herrera et al. 2005). Moreover, breeding birds were observed to forage over a very restricted area located within 2–4 nautical miles of the colony in intertidal habitats where they feed on grapsid crabs (Yorio et al. 2004). Thus, the foraging range of breeding gulls could be defined by the spatial extension of these intertidal habitats at least in Patagonia (Yorio et al. 2004). Accordingly, this seems to be one of the few species of gulls with relatively specialized feeding habits in its breeding grounds (Burger and Gochfeld 1996, Yorio et al. 2005). Previous diet studies conducted in wintering grounds of southern Buenos Aires Province also reinforce the relatively high feeding specialization of the Olrog's Gull outside the breeding season (Spivak and Sánchez 1992, Copello and Favero 2001, Berón

2003, 2009, Berón and Favero 2010). However, gulls are not limited to estuarine habitats in winter. During the non-breeding season, the species appears to be a more generalist forager, at least in Buenos Aires Province, than during the breeding season. Previous studies have pointed mussels (*Mytilus* spp.) (Escalante 1966), fish (Olrog 1967, Spivak and Sánchez 1992, Berón et al. 2007), insects (Spivak and Sánchez 1992), grains (Petracci et al. 2007), sewage (Martínez et al. 2000), and fishery-related items such as discarded offal from fishing vessels (Martínez et al. 2000) and factories, and bait abandoned by sport fishermen (Berón 2009) as occasional prey. Hence, the species may show certain ecological plasticity in its wintering grounds, placing the Olrog's Gull closer to the generalist pattern of the majority of larids (Petracci et al. 2007).

In general, the interactions between marine wildlife and fisheries have been classified into direct or indirect and either positive or negative (Tasker et al. 2000, Montevecchi 2002). The provision of food in the form of fishery waste and discards by commercial harbours and other fishing-related activities (Bertellotti et al. 2001, Giaccardi and Yorio 2004, Gandini et al. 2008) can be regarded as a direct positive effect of fisheries on local seabirds. For instance, several colonies of another larid, the Kelp Gull, have grown considerably in Argentina in the last few decades, at least partly as a result of increased human food resources provided by coastal fisheries and urban and fishery waste tips (Yorio and Giaccardi 2002, Yorio and Caille 2004, Giaccardi and Yorio 2004, Yorio et al. 2005). Discards of the Argentine commercial high-seas fleet directed to the hake fishery varied annually 15563–46113 tonnes during the 1990–1997 period (Dato et al. 2003). Fishers do not process the catch onboard, hence the bulk of the discards are comprised by whole fish of unwanted commercial size (in the case of the target species) or non targeted species (by-catch fraction). Although such use of discards could be understood as beneficial for the conservation prospects of the Olrog's Gull (Martínez et al. 2000), changes in the population size have not been noted among the species. Besides the increase of risk of mortality due to collisions and entanglements, species such as the Olrog's Gull could also be affected by the expansion in the population of larger and more aggressive species such as the Kelp Gull (Yorio et al. 2005). Moreover, the Olrog's Gull has been reported to exploit sport fishing by-products with detrimental outcomes as the ingestion of fishing discards and baits containing hooks or severe entanglement with fishing lines which leads to an increase in adult mortality that is unsustainable (Berón et al. 2007). It is concerning that the Olrog's Gull could be regularly attending high-seas fisheries, since this vulnerable species may be affected by fishing operations during the sensitive period of chick rearing. Further studies that monitor and give more precisions about these interactions with coastal and high-seas fishing vessels should be encouraged, along with further training programmes to upgrade the skills of fisheries' observers for the identification and the estimation of abundance of seabirds attending trawlers in Argentine waters.

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