

## URBAN AND FISHERY WASTE TIPS AS FOOD SOURCES FOR BIRDS IN NORTHERN COASTAL PATAGONIA, ARGENTINA

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**Resumen.** – Basurales urbanos y pesqueros como fuentes de alimento para aves en las costas del norte de Patagonia, Argentina. – Los basurales son importantes fuentes de alimento para un gran número de especies de aves en todo el mundo, particularmente especies oportunistas y carroñeras. Efectuamos un relevamiento regional de basurales urbanos y pesqueros en la costa norte de Patagonia para (1) identificar las especies de aves que los utilizan, (2) determinar variaciones estacionales en la presencia y abundancia, y (3) evaluar diferencias en el uso entre localidades. Durante 1996, relevamos 17 basurales urbanos y pesqueros en las costas de las Provincias de Río Negro y Chubut, Argentina. Se efectuaron cuatro visitas a cada basural, una en cada estación del año. Se observaron aves aprovechando los residuos en la mayoría de los basurales visitados. Se identificaron once especies. La Gaviota Cocinera (*Larus dominicanus*) fue la especie más frecuentemente registrada, estando presente en el 82–88% de los basurales muestreados, en números que variaron dependiendo del sitio y la estación, y mostrando un máximo de 7300 individuos durante el conteo de verano. En contraste, las otras especies de aves fueron observadas menos regularmente y, de estas, sólo la Paloma Doméstica (*Columba livia*) y el Chimango (*Milvago chimango*) fueron registrados en números importantes en algunas localidades. La Gaviota Cocinera fue también más abundante en los basurales pesqueros y, en todas las estaciones, el número de adultos fue significativamente mayor que el de las clases de edad más jóvenes. El número de Gaviotas Cocineras presente en los basurales se correlacionó positivamente con el tamaño de los asentamientos humanos en todas las estaciones, salvo la primavera. Las diferencias en el patrón de presencia y abundancia en los basurales entre las especies podrían estar relacionadas con su distribución, tamaño poblacional, y ecología alimentaria.

**Abstract.** – Waste tips constitute important food sources widely utilized by a large number of bird species worldwide, particularly by opportunistic and scavenging species. We conducted a regional survey of urban and fishery waste tips in northern coastal Patagonia to (1) identify bird species that use waste tips, (2) determine seasonal changes in occurrence and abundance, and (3) assess differences in use between locations. During 1996, we surveyed 17 urban and fishery waste tips along the coasts of the provinces of Río Negro and Chubut, Argentina. Four visits were made to each waste tip, once in each of the four seasons. Birds were observed taking advantage of waste at most of the visited tips. Eleven species were identified. The Kelp Gull (*Larus dominicanus*) was the most frequently recorded species, being present at 82–88% of the tips sampled, with numbers that varied depending on the site and season and showing a maximum of 7300 individuals during the summer count. In contrast, the other bird species were observed less regularly and, of these, only the Rock Dove (*Columba livia*) and the Chimango (*Milvago chimango*) were recorded in significant numbers at some of the sites. Kelp Gulls were also more abundant at fishery waste tips and the number of adults was significantly larger than that of younger age-classes in all seasons. Number of Kelp Gulls present at the tips was significantly correlated with the size of human

settlements at all seasons except spring. Differences between species in the patterns of occurrence and abundance at waste tips may be related to their distribution, population size and feeding ecology. *Accepted 21 January 2002.*

**Key words:** Waste tips, food sources, birds, coastal Patagonia, Kelp Gull, *Larus dominicanus*.

## INTRODUCTION

Waste tips constitute important food sources widely utilized by a large number of bird species worldwide, particularly by opportunistic and scavenging species (Pomeroy 1975, Donázar 1992, Belant 1997). These artificial food sources are predictable and abundant, and the use of this food supplement may affect population dynamics of some species. For example, food sources of human origin have been implicated in the growth of several gull populations at many regions in both the northern and southern hemisphere (Spaans & Blokpoel 1991).

Urban waste at cities and towns along the Patagonian coast is disposed in open tips and, in contrast to other regions, garbage is rarely covered. As a result, waste is exposed and available to scavenging and opportunistic birds for significant periods of time. In addition, fish processing plants at several of these cities produce large quantities of fishery waste which are disposed within or close to urban waste tips (Yorio *et al.* 1996). As with the urban waste, fish waste is only occasionally covered at some tips (Giaccardi *et al.* 1997). Besides being predictable and abundant, fishery waste is of higher nutritional value.

Little is known about the importance of these artificial food sources for birds in coastal Patagonia, except for a few studies of the use of waste tips by Kelp Gulls (*Larus dominicanus*) (Giaccardi *et al.* 1997). Knowledge of the bird species that utilize these tips and the number of individuals that feed on waste is needed for the correct development of management guidelines. In addition, baseline information at these coastal tips is needed

to evaluate future changes in the magnitude of use due to changes in disposal practices. The goal of this study was to conduct a regional survey of urban and fishery waste tips in northern coastal Patagonia to (1) identify bird species that use waste tips, (2) determine seasonal changes in occurrence and abundance, and (3) assess differences in use between locations.

## METHODS

During 1996, we surveyed 17 urban and fishery waste tips along the coasts of the provinces of Río Negro and Chubut, Argentina (Fig. 1). Four visits were made to each waste tip, once in each of the seasons (15–20 January, 26–29 April, 15–19 July, and 1–4 November). We included in the study the assessment of tips at cities located a few kilometers inland from the sea coast, such as Viedma, Sierra Grande and Trelew, as previous information had indicated that they were also used by coastal birds (pers. observ.). At each tip, we identified the bird species present and made counts with spotting scopes 20–45x and binoculars 10x50 from vantage points and from inside a vehicle. In each visit we counted all birds present at the tip. In addition, Kelp Gulls were identified into three age classes on the basis of plumage characteristics (Bo *et al.* 1995): juveniles (1<sup>st</sup>-winter and 1<sup>st</sup>-summer), immatures (2<sup>nd</sup>-winter to 3<sup>rd</sup>-summer), and adults (from 4<sup>th</sup>-winter on). We estimated the number of Kelp Gulls of each age-class by counting the number of individuals of each class at a sample of gull groups distributed throughout the tip, and then extrapolating the average proportion

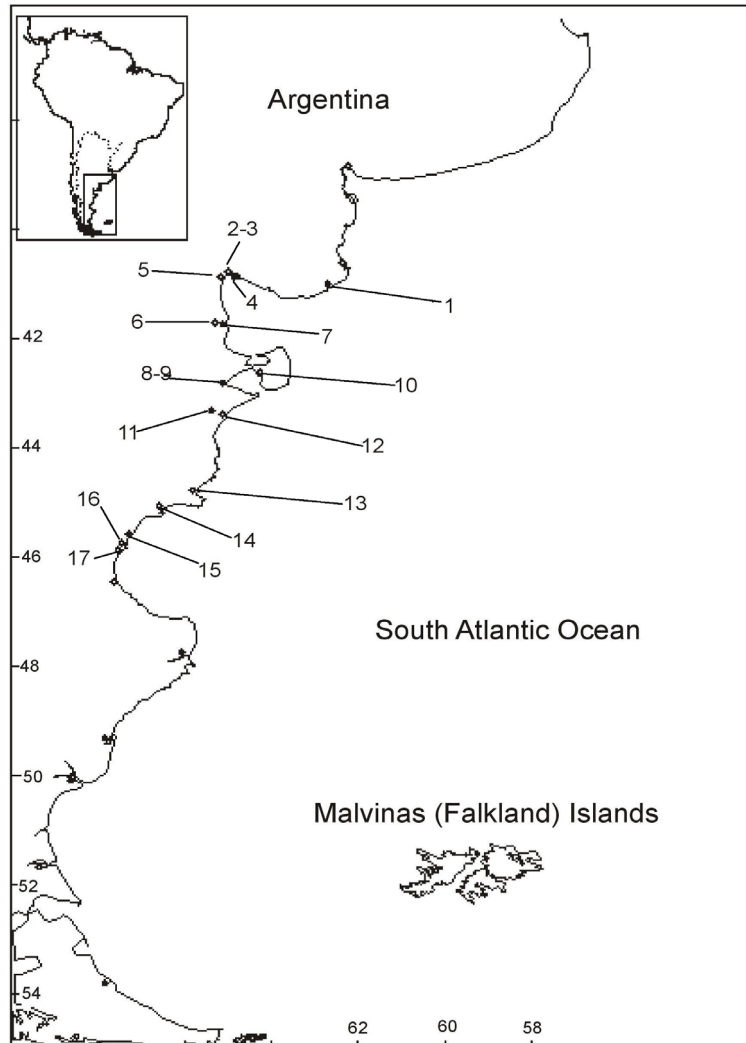


FIG. 1. Geographical location of waste tips surveyed along the coasts of the Río Negro and Chubut Provinces, Argentina. Numbers correspond to sites in Tables 1–4.

to the total count of gulls for that date.

## RESULTS

Birds were observed taking advantage of waste at most of the visited tips. Eleven species were identified: Chimango (*Milvago chimango*), Crested Caracara (*Polyborus plancus*),

Turkey Vulture (*Cathartes aura*), Black-headed Vulture (*Coragyps atratus*), Cattle Egret (*Bubulcus ibis*), Kelp Gull, Brown-hooded Gull (*L. maculipennis*), Southern Skua (*Catharacta antarctica*), Shiny Blackbird (*Molothrus bonariensis*), Rock Dove (*Columba livia*), and House Sparrow (*Passer domesticus*).

The Kelp Gull was the most frequently

TABLE 1. Bird species and abundance (number of individuals) at coastal waste tips of the Provinces of Río Negro and Chubut, Argentina, in the summer (15–20 January) of 1996.

| Location                              | Species <sup>1</sup> |    |    |    |    |      |    |    |    |     |    |
|---------------------------------------|----------------------|----|----|----|----|------|----|----|----|-----|----|
|                                       | CH                   | CC | TV | BV | CE | KG   | BG | SS | SB | RD  | HS |
| 1. Viedma (u) <sup>2</sup>            |                      |    |    |    |    | 0    |    |    |    |     |    |
| 2. San Antonio Oeste (u)              |                      |    |    |    |    | 60   |    |    |    |     |    |
| 3. San Antonio Oeste (f) <sup>2</sup> | >20                  |    | 1  |    |    | 1328 | 38 |    |    |     |    |
| 4. San Antonio Este (u)               |                      |    |    |    |    | 0    |    |    |    |     |    |
| 5. Las Grutas (u)                     |                      |    |    |    |    | 411  | 7  |    |    |     |    |
| 6. Sierra Grande (u)                  |                      |    |    |    |    | 36   |    |    |    |     |    |
| 7. Playas Doradas (u)                 |                      |    |    |    |    | 19   |    |    |    |     |    |
| 8. Puerto Madryn (u)                  |                      |    |    |    |    | 984  |    |    |    | >30 |    |
| 9. Puerto Madryn (f)                  |                      |    |    |    |    | 2038 |    |    |    |     |    |
| 10. Puerto Pirámide (u)               |                      |    |    |    |    | 29   |    |    |    |     |    |
| 11. Trelew (u)                        |                      |    |    |    |    | 132  |    |    |    |     |    |
| 12. Rawson (u, f)                     |                      |    |    |    |    | 7300 | 4  |    |    |     |    |
| 13. Camarones (u)                     |                      |    |    |    |    | 102  |    | 4  |    |     |    |
| 14. Bahía Bustamante (u)              |                      |    |    |    |    | 21   |    |    |    |     |    |
| 15. Caleta Córdoba (u)                |                      |    |    |    |    | 148  |    |    |    |     |    |
| 16. Comodoro Rivadavia (u)            |                      |    |    |    |    | 3502 |    |    |    | >30 |    |
| 17. Rada Tilly (u)                    |                      |    |    |    |    | 0    |    |    |    |     |    |

<sup>1</sup>CH: Chimango (*Milvago chimango*), CC: Crested Caracara (*Polyborus plancus*), TV: Turkey Vulture (*Cathartes aura*), BV: Black-headed Vulture (*Coragyps atratus*), CE: Cattle Egret (*Bubulcus ibis*), KG: Kelp Gull (*Larus dominicanus*), BG: Brown-hooded Gull (*Larus maculipennis*), SS: Southern Skua (*Catharacta antarctica*), RD: Rock Dove (*Columba livia*), SB: Shiny Blackbird (*Molothrus bonariensis*), HS: House Sparrow (*Passer domesticus*).

<sup>2</sup>u: urban; f: fishery.

recorded species, being present at 82–88% of the tips sampled, depending on the season (Tables 1–4). The Kelp Gull was also the most abundant species, with numbers that varied depending on the site and season, and showing a maximum of 7300 individuals during the summer count. In contrast, the other bird species were observed less regularly (Tables 1–4) and, of these, only Rock Doves and Chimangos were recorded in significant numbers at some of the sites (Table 1).

Birds, particularly Kelp Gulls, were more abundant during the fall and winter than the summer and spring counts. Kelp Gulls were also more abundant at fishery waste tips (Tables 1–4). The number of adult Kelp Gulls

was significantly larger than that of younger age-classes in all seasons (Kruskall-Wallis ANOVA, all  $P > 0.001$ ) (Figs 2 and 3). Number of Kelp Gulls present at urban tips was significantly correlated with human population size (Spearman rank order correlation) in both the fall ( $r_s = 0.87$ ,  $P = 0.0003$ ,  $n = 12$ ) and winter ( $r_s = 0.73$ ,  $P = 0.008$ ,  $n = 12$ ), but not in the spring ( $r_s = 0.46$ ,  $P = 0.12$ ,  $n = 13$ ) and summer ( $r_s = 0.53$ ,  $P = 0.06$ ,  $n = 13$ ).

## DISCUSSION

Eleven bird species were recorded feeding at urban and fishery waste tips in northern coastal Patagonia, being the Kelp Gull the

TABLE 2. Bird species and abundance (number of individuals) at coastal waste tips of the Provinces of Río Negro and Chubut, Argentina, in the fall (26–29 April) of 1996. For abbreviations, see Table 1.

| Location                   | Species |    |    |    |    |      |    |    |    |      |    |
|----------------------------|---------|----|----|----|----|------|----|----|----|------|----|
|                            | CH      | CC | TV | BV | CE | KG   | BG | SS | SB | RD   | HS |
| 1. Viedma (u)              |         |    |    |    |    | 550  |    |    |    | 1750 |    |
| 2. San Antonio Oeste (u)   | 1       |    |    |    | 1  | 184  |    |    |    |      |    |
| 3. San Antonio Oeste (f)   | 1       |    | 1  |    |    | 5813 |    |    |    |      |    |
| 4. San Antonio Este (u)    |         |    |    |    |    | 113  |    |    |    |      |    |
| 5. Las Grutas (u)          |         |    |    |    |    | 80   |    |    |    |      |    |
| 6. Sierra Grande (u)       |         |    |    |    |    | 123  |    |    |    |      |    |
| 7. Playas Doradas (u)      |         |    |    |    |    | 1    |    |    |    |      |    |
| 8. Puerto Madryn (u)       |         |    |    |    |    | 2590 |    |    |    | >30  |    |
| 9. Puerto Madryn (f)       |         |    |    |    |    | 2715 |    |    |    |      |    |
| 10. Puerto Pirámide (u)    |         |    |    |    |    | 1    |    |    |    |      |    |
| 11. Trelew (u)             | 200     |    |    |    |    | 2442 |    |    |    |      |    |
| 12. Rawson (u, f)          |         |    |    |    |    | 3177 |    |    |    |      |    |
| 13. Camarones (u)          |         | 2  |    |    |    | 28   |    |    |    |      |    |
| 14. Bahía Bustamante (u)   |         |    |    |    |    | NV   |    |    |    |      |    |
| 15. Caleta Córdoba (u)     |         |    |    |    |    | 0    |    |    |    |      |    |
| 16. Comodoro Rivadavia (u) |         |    |    |    |    | 3700 |    |    |    | >20  |    |
| 17. Rada Tilly (u)         |         |    |    |    |    | 0    |    |    |    |      |    |

TABLE 3. Bird species and abundance (number of individuals) at coastal waste tips of the Provinces of Río Negro and Chubut, Argentina, in the winter (15–19 July) of 1996. For abbreviations, see Table 1.

| Location                   | Species |    |    |    |    |      |    |    |    |      |    |
|----------------------------|---------|----|----|----|----|------|----|----|----|------|----|
|                            | CH      | CC | TV | BV | CE | KG   | BG | SS | SB | RD   | HS |
| 1. Viedma (u)              |         |    |    |    |    | 2900 |    |    |    | >200 |    |
| 2. San Antonio Oeste (u)   |         |    |    |    |    | 245  |    |    |    |      |    |
| 3. San Antonio Oeste (f)   |         |    |    |    |    | 2354 |    |    |    |      |    |
| 4. San Antonio Este (u)    |         |    |    |    |    | 54   |    |    |    |      |    |
| 5. Las Grutas (u)          |         |    |    |    |    | 103  |    |    |    |      |    |
| 6. Sierra Grande (u)       |         |    |    |    |    | 0    |    |    |    |      |    |
| 7. Playas Doradas (u)      |         |    |    |    |    | 11   |    |    |    |      |    |
| 8. Puerto Madryn (u)       |         |    |    |    |    | 2635 |    |    |    |      |    |
| 9. Puerto Madryn (f)       |         |    |    |    |    | 6857 |    |    |    |      |    |
| 10. Puerto Pirámide (u)    |         |    |    |    |    | 0    |    |    |    |      |    |
| 11. Trelew (u)             | > 20    |    |    |    |    | 3680 |    |    |    |      |    |
| 12. Rawson (u, f)          |         |    |    |    |    | 1351 |    |    |    |      |    |
| 13. Camarones (u)          |         |    |    |    |    | 182  |    |    |    |      |    |
| 14. Bahía Bustamante (u)   |         |    |    |    |    | NV   |    |    |    |      |    |
| 15. Caleta Córdoba (u)     |         |    |    |    |    | 0    |    |    |    |      |    |
| 16. Comodoro Rivadavia (u) |         |    |    |    |    | 1087 |    |    |    | >30  |    |
| 17. Rada Tilly (u)         |         |    |    |    |    | 0    |    |    |    |      |    |

TABLE 4. Bird species and abundance (number of individuals) at coastal waste tips of the Provinces of Río Negro and Chubut, Argentina, in the spring (1–4 November) of 1996. For abbreviations, see Table 1

| Location                   | Species |    |    |    |    |      |     |    |     |      |    |  |
|----------------------------|---------|----|----|----|----|------|-----|----|-----|------|----|--|
|                            | CH      | CC | TV | BV | CE | KG   | BG  | SS | SB  | RD   | HS |  |
| 1. Viedma (u)              |         |    |    |    |    | 0    |     |    |     | >200 |    |  |
| 2. San Antonio Oeste (u)   |         |    |    |    |    | 10   |     |    |     |      |    |  |
| 3. San Antonio Oeste (f)   |         |    |    | 3  |    | 523  |     |    |     |      |    |  |
| 4. San Antonio Este (u)    |         |    |    | 5  |    | 6    |     |    | >30 |      |    |  |
| 5. Las Grutas (u)          |         |    |    |    |    | 23   |     |    | >20 | >20  |    |  |
| 6. Sierra Grande (u)       |         |    |    |    |    | 29   |     |    |     |      |    |  |
| 7. Playas Doradas (u)      |         |    |    |    |    | 5    |     |    |     |      |    |  |
| 8. Puerto Madryn (u)       |         |    |    |    |    | 396  |     |    |     |      |    |  |
| 9. Puerto Madryn (f)       |         |    |    |    |    | 1460 |     |    |     |      |    |  |
| 10. Puerto Pirámide (u)    |         |    |    |    |    | 145  |     |    |     |      |    |  |
| 11. Trelew (u)             | >50     |    |    |    |    | 244  | 170 |    |     |      |    |  |
| 12. Rawson (u, f)          | >10     |    |    |    |    | 919  | 25  |    |     |      |    |  |
| 13. Camarones (u)          |         |    |    |    |    | 92   |     |    |     |      |    |  |
| 14. Bahía Bustamante (u)   |         |    |    |    |    | 0    |     |    |     |      |    |  |
| 15. Caleta Córdoba (u)     |         |    |    |    |    | 0    |     |    |     |      |    |  |
| 16. Comodoro Rivadavia (u) |         |    |    |    |    | 110  |     |    |     |      |    |  |
| 17. Rada Tilly (u)         |         |    |    |    |    | 0    |     |    |     |      |    |  |

most frequently recorded and abundant species. Gulls throughout the world take advantage of human waste (Furness & Monaghan 1987, Coulson *et al.* 1987, Burger 1988, Spaans & Blokpoel 1991, Pons 1992). Of the four gull species which regularly use the Patagonian coast for feeding and/or breeding, the Kelp Gull is the most abundant at waste tips (Giaccardi *et al.* 1997, this study).

Brown-hooded gulls were observed in relatively low numbers and only in the summer and spring counts. This gull species has been regularly recorded at the Rawson waste tip between August and April in numbers that varied between 2 and 285 individuals (Giaccardi 1993). Although Dolphin and Olrog's (*Larus scoresbii* and *L. atlanticus*, respectively) gulls may occasionally use waste tips, they were not observed doing so in this study. Dolphin Gulls have been recorded feeding at fishery waste in Puerto Deseado, Santa Cruz

(E. Frere & P. Gandini, unpubl.) and at slaughter houses in the Malvinas (Falkland) Islands (Woods & Woods 1997), while the Olrog's Gull has been recorded feeding at the urban waste tip in Bahía Blanca, Buenos Aires (D. Rábano, pers. com.). Differences in the patterns of occurrence and abundance at waste tips between gull species may be related to their distribution, population size and feeding ecology. Kelp Gulls are feeding generalists, taking advantage of food sources resulting from human activities and feeding on waste throughout its southern-hemispheric breeding range (Fordham 1970, Steele 1992, Coulson & Coulson 1993, Bertellotti & Yorio 1999). It is widely distributed and is the third most abundant breeding seabird on the Argentine coast, with over 72000 pairs (Yorio *et al.* 1999). Brown-hooded Gulls feed mainly on insects (Murphy 1936, Humphrey *et al.* 1970, Lizurume *et al.* 1995) and their coastal breeding population is relatively low, nesting

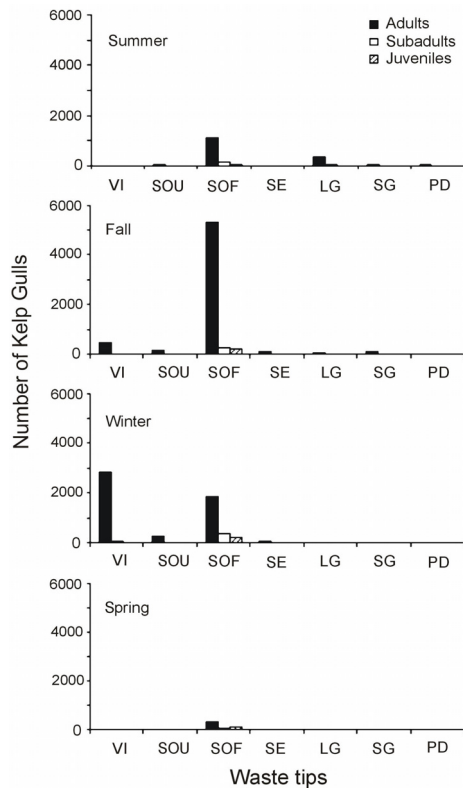


FIG. 2. Number of Kelp Gulls of each age-class at waste tips in Río Negro, Argentina. VI: Viedma, SOU: San Antonio Oeste (urban), SOF: San Antonio Oeste (fishery), SE: San Antonio Este, LG: Las Grutas, SG: Sierra Grande, PD: Playas Doradas.

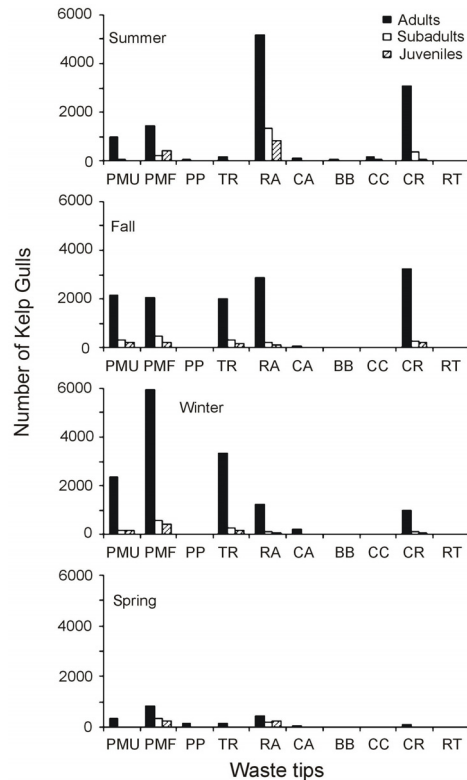


FIG. 3. Number of Kelp Gulls of each age-class at waste tips in Chubut, Argentina. PMU: Puerto Madryn (urban), PMF: Puerto Madryn (fishery), PP: Puerto Pirámide, TR: Trelew, RA: Rawson, CA: Camarones, BB: Bahía Bustamante, CC: Caleta Córdoba, CR: Comodoro Rivadavia, RT: Rada Tilly.

at only three coastal or near coastal locations from southern Buenos Aires to central Chubut (Yorio *et al.*1999). Dolphin and Olrog’s gulls are believed to have fairly specialized feeding habits during the breeding season (Yorio *et al.* 1996, Herrera 1997) and have relatively small population sizes (Yorio *et al.* 1999).

More detailed studies of Kelp Gull use of waste tips in Rawson and Puerto Madryn have shown that gull numbers can vary considerably both throughout the day and season (Giaccardi *et al.* 1997, Giaccardi & Yorio in

prep.). Thus, further studies are needed to understand attendance patterns at most of the waste tips visited during this study. However, the observed differences in abundance among species, locations and seasons are large enough to show that Kelp Gulls are by far the most frequent and abundant bird species feeding at tips, that some sites are significantly more important for gulls than others, and that attendance patterns vary depending on the season.

Number of gulls at tips appear to be

related both to the quality and quantity on available waste. Fishery waste tips attracted more gulls than urban waste tips. Fishery waste tips offer food sources that are abundant, predictable and of higher nutritional value than urban waste. The preference of Kelp Gulls for this type of waste both during and outside the breeding season has been shown at regularly followed sites, such as Rawson (Giaccardi *et al.* 1997) and Puerto Madryn (Bertellotti *et al.* 2001, M. Giaccardi & P. Yorio in prep.). In addition, gull abundance was higher at urban waste tips from larger human settlements, suggesting that the availability of refuse affects the observed pattern of use.

Skuas have a broad feeding strategy, which includes kleptoparasitism, predation and scavenging, and some species commonly feed on refuse (Furness 1987). Southern Skuas were recorded in low numbers only during the summer and at the Camarones waste tip. As in the case of gulls, the observed pattern of presence at tips during this study may reflect its breeding distribution and population size, as this species nests from Punta Tombo, central Chubut, south to central Santa Cruz, and its total breeding population along the northern coast of Patagonia was estimated in less than 500 pairs (Yorio *et al.* 1998). The city of Camarones, where skuas were recorded feeding on waste, is located close to one of the main breeding areas for Southern Skuas (Yorio *et al.* 1998).

Scavenging raptors frequently take advantage of human waste worldwide (Pomeroy 1975, Donazar 1992, Blanco 1994, 1997, Houston 1994, White *et al.* 1994). Four raptors, Chimango, Crested Caracara, Turkey Vulture, and Black-headed Vulture were recorded feeding on waste during this study. All of these species obtain an important part of their food by scavenging (Houston 1994, White *et al.* 1994). Chimangos frequently con-

gregate in large numbers around shellfish processing factories to feed on remains left attached to discarded shells and Crested Caracaras often feed on discarded waste or insects found at tips (Humphrey *et al.* 1970, White *et al.* 1994). Black-headed Vultures have been also recorded feeding on dumps and, like gulls, have been blamed for spreading diseases of livestock and spreading salmonella and other health hazards to humans (Houston 1994). It has been suggested that artificial food sources may benefit raptors increasing their survival rates (Donazar 1992). Chimangos and Crested Caracaras, in particular, have benefited from increasing amount of human waste (White *et al.* 1994). Although raptors were recorded in relatively low numbers compared with the Kelp Gull, results show that the food availability at some tips such as the Trelew urban waste tip, may be significant for Chimangos. Future research should focus on the importance of artificial food sources for this raptor, analyzing in more detail the seasonal fluctuations in the number of individuals feeding on waste.

Most birds that take advantage of artificial food sources feed on waste. However, several species are attracted to tips to feed on live prey which use waste, such as insects and rodents (Donazar 1992). Cattle Egrets, Rock Doves and both passerines recorded in this study are generalist or opportunist foragers which, like the Brown-hooded Gull (Giaccardi 1993), most likely feed on such prey. Like for other birds that take advantage of waste at Patagonian dumps, except Kelp Gulls, little is known about the importance of these artificial food sources and the possible effects of this supplement on their populations dynamics. Further studies should concentrate on waste tips at the larger coastal human settlements which are providing significant amounts of food to birds, particularly gulls, and assess conservation and management implications.



## ACKNOWLEDGMENTS

This study was supported by Wildlife Conservation Society, the Dirección General de Conservación y Control de Calidad de Chubut, and the Patagonian Coastal Zone Management Plan, a Global Environmental Facility/United Nations Development Programme project implemented by Fundación Patagonia Natural and Wildlife Conservation Society. We thank J. Owen for field assistance and logistical support.

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