ROADSIDE RAPTOR SURVEYS IN VALDES PENINSULA (PATAGONIA, ARGENTINA)

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ABSTRACT.— The Valdes Peninsula is a high-value natural area located on the Atlantic coast of the Argentine Patagonia. This research sought to survey raptor species of the peninsula, which has been little investigated. Roadside raptor surveys were carried out along a 451-km roadside transect in November 2012 and in April 2013. Ninety-five diurnal raptors were observed (43 in 2012 and 52 in 2013) comprising a total of 9 species. The most detected species were *Cathartes aura* and *Milvago chimango*. The abundances recorded in our study were lower than those obtained in other similar studies in continental Patagonia.

KEY WORDS: *Patagonia, raptors, roadside surveys, species richness, steppe, Valdes Peninsula.*

RESUMEN. CONTEOS DE AVES RAPACES EN RUTA EN PENÍNSULA VALDÉS (PATAGONIA, ARGENTINA).— La Península Valdés es un área de alto valor natural localizada en la costa atlántica de la Patagonia argentina. El objetivo de este estudio fue realizar un muestreo de las aves rapaces de la península, pues han sido hasta ahora poco investigadas. Se realizaron conteos de aves rapaces en ruta a lo largo de una transecta de 451 km en noviembre de 2012 y abril de 2013. Fueron registradas 95 rapaces diurnas (43 en 2012 y 52 en 2013) pertenecientes a 9 especies. Las especies más detectadas fueron *Cathartes aura* y *Milvago Chimango*. Las abundancias registradas fueron menores que las observadas en otros estudios similares realizados en áreas continentales de Patagonia.

PALABRAS CLAVE: *conteos en ruta, estepa, Patagonia, Península Valdés, rapaces, riqueza de especies.*

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Roadside surveys can be useful to examine relative abundance, density, habitat use, and perch preference of birds (Diesel 1984, Fuller and Mosher 1987) and have been widely employed to describe species richness and relative abundance of raptors in poorly known areas (see review in Ellis et al. 1990). Surveys also permit monitoring changes in raptor populations over time (Mathisen and Mathisen 1968, Wotzkow and Wiley 1988). However, these comparisons require similar routes of travel and observation methods in each survey.

The avifauna of Valdes Peninsula (Patagonia, Argentina) is relatively well known, especially with regard to seabirds and shorebirds (Bertellotti et al. 1995, D'Amico et al. 2004, Hernández et al. 2004, Morrison et al. 2004, Hernández and Bala 2007, Cooke and Mills 2008) and passerines (Pruscini et al. 2014). Little information is available on diurnal raptors and their relative abundances, even though the site is an Important Bird Area (IBA AR237; Yorio et al. 2005, Coconier and Di Giacomo 2009).

Raptors are considered as top predators (Sergio et al. 2005); the occurrence, density and productivity of many top predators depend on whole ecosystem productivity, which affects food availability in a bottom-up manner (Newton et al. 1979, Carroll et al. 2001, Sergio et al. 2004) and often has a major influence on biodiversity value (Rosenzweig 1995, Gaston 1996). When raptors are not surviving in a habitat, it is a strong indication that something negatively affect the environment upon which they depend. Indeed they are

considered a keystone species because, despite their relatively small numerical abundance, they exert a great influence in stabilizing the entire ecological community and they can be considered ecological indicators of the quality of the terrestrial ecosystem.

We report the results obtained in roadside raptor surveys carried out in the Valdes Peninsula. There are many of these surveys reported for northern Patagonia (e.g., Olrog 1979, Ellis et al. 1990, Donázar et al. 1993, Travaini et al. 1995), but these studies were conducted in extensive areas. Our research focuses on Valdes Peninsula, aiming at the identification of raptors species and their abundances in order to increase the knowledge about the avifauna of this site and investigate differences between our results and those of other studies conducted in continental Patagonia.

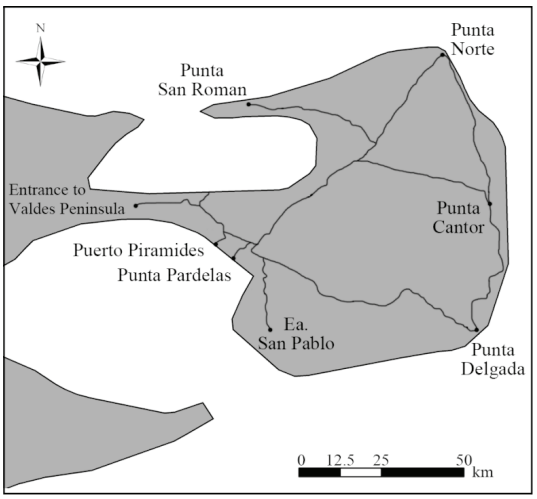

Figure 1. Map of the Valdes Peninsula, north-eastern Chubut Province, Argentina, showing the location of the roads (black lines) travelled for the roadside raptor surveys.

METHODS

The study was carried out in the Valdes Peninsula (Fig. 1), including also the Ameghino isthmus. The Valdes Peninsula is located in the Atlantic coast, in north-eastern Chubut Province, Argentina. It is about 3600 km^2 and it is an important nature reserve which was included on the list of World Heritage Sites by UNESCO. The landscape is composed of typical steppe environment, consisting of wide areas of arid flat lands interspersed with salt lakes, the largest ones named Salina Grande and Salina Chica, the latter being 40 m below sea level, the lowest point in South America.

Two surveys were conducted along a 451-km roadside transect (Fig. 1) during 9–21 November 2012 and 1–11 April 2013. These two periods of time were chosen in order to provide the greatest probability of surveying all species present at the beginning and at the end of the breeding season (Hardey et al. 2006). As suggested by Donázar et al. (1993) and Travaini et al. (1995), roadside surveys were conducted by three experienced observers: the driver, another person sitting in the front passenger seat, and a third observer in the back. An additional fourth person recorded all observations. Average driving speed was 50 km/h. Raptors were only recorded while in transit, although occasional stops were made to identify individuals using binoculars or a spotting scope up to approx. 500 m from the road.

RESULTS

We observed 43 diurnal raptors during the November 2012 survey and 52 during the April 2013 survey, comprising a total of nine species (Table 1). We found six species in both surveys; *Circus buffoni* and *Caracara plancus* was recorded only in 2013, and *Falco femoralis* only in 2012. *Milvago chimango* was the most detected species in 2012, whereas *Cathartes aura* was the most detected one in 2013.

Observed raptors were evenly distributed along the transect in the study area, with the exception of the species of the genus *Circus*, observed mainly on the Ameghino isthmus (two *Circus buffoni* in 2013, two *Circus cinereus* in 2012 and in 2013), and *Cathartes aura* (18 of the 28 individuals surveyed were seen simultaneously at Punta Norte, feeding on carcasses of a juvenile *Spheniscus magellanicus* on a beach the day after a storm surge).

DISCUSSION

The location of this study provided many benefits for roadside raptor surveys. First, the extremely flat landscape with low shrubby vegetation that characterizes the Patagonian steppe allows good visibility. Second, raptors have never been directly persecuted in this area as in other parts of the world, so they

Table 1. Number of individuals (individuals/km in parenthesis) recorded in roadside raptor surveys carried out in Valdes Peninsula, north-eastern Chubut Province, Argentina, during November 2012 and April 2013.

	November 2012	April 2013
Cathartidae		
Cathartes aura	9 (0.020)	28 (0.062)
Accipitridae		
Circus buffoni	-	2 (0.004)
Circus cinereus	5 (0.011)	3 (0.007)
Geranoaetus polyosoma	4 (0.009)	3 (0.007)
Falconidae		
Caracara plancus	-	2 (0.004)
Milvago chimango	16 (0.035)	9 (0.020)
Falco sparverius	4 (0.009)	3 (0.007)
Falco femoralis	2 (0.004)	-
Falco peregrinus	3 (0.007)	2 (0.004)

appear to be more trusting towards human presence; therefore, they are more noticeable and it is less likely that birds flush at the arrival of the observer, obstructing their identification. These factors made counts relatively simple and the results more reliable.

Our results regarding the abundance of raptor species were qualitatively similar to those of Traviani et al. (1995) when considering their study performed in the north of Patagonia in shrub steppe areas (i.e., an environment similar to Valdes Peninsula). However, there were a few exceptions, such as the record of *Geranoaetus albicaudatus* and *Geranoaetus melanoleucus*, which we did not detect in our study area. Though, in 2012, we did spot a presumed recently occupied nest of *Geranoaetus melanoleucus*. Travaini et al. (1995) did not record *Falco peregrinus*, which we observed in 2012 and 2013. This could be explained due to the lack of suitable nest sites for this species (e.g., cliffs) in the area monitored by Travaini et al. (1995). The steppe of the Valdes Peninsula reaches the coast, where there are numerous headlands and crags which may provide optimal nest sites for this species.

Concerning abundance, the number of individuals of the raptors species surveyed in our study was higher in 2012 than 2013 for all species except for *Cathartes aura* (the high number is due to a particular circumstance; i.e., the presence of penguin carcasses at Punta Norte during the survey), *Circus buffoni*, and *Caracara plancus*. This may be due to the fact that in 2012 the census was carried out in spring, the season in which the abundance of prey can affect the concentration of raptors. Furthermore, raptors can be identify more easily in spring than in other seasons because of their reproductive behaviour (Hardey et al. 2006).

Throughout the 451-km transect surveyed, we recorded one raptor every 10.5 km in 2012 and one raptor every 8.7 km in 2013. These results are almost 20 times lower than those obtained by Travaini et al. (1995) in northern Patagonia (one individual every 0.47 km). Donázar et al. (1993) carried out a similar study in continental Patagonian steppe and also showed a much lower frequency of raptors (one individual every 2.57 km) than in Travaini et al. (1995). However, those results are still higher than the frequency observed in our study area. The conditions that may have influenced this result are manifold, in the first place some differences between the types of road travelled. Roadside habitats are known to contain a high abundance of small mammals, especially in wide verges (Adams and Geis 1983, Meunier et al. 1999), but the higher traffic in continental areas can increase the number of dead animals. Some raptors are opportunistic feeders, and therefore benefits from road casualties (Meunier et al. 2000). Conversely, there have been few evaluations of the significance of road mortality on raptor populations, except for *Tyto alba*, for which the detrimental effect of roads on local populations is commonly suggested (Moore and Mangel 1996). Furthermore, this roads are almost always accompanied by service lines (e.g., electricity or telephone poles) that provide nesting and perching sites and can allow access to food, especially in vegetated portions of rights-of-way (Williams and Colson 1989, Morelli et al. 2014). The conditions of Valdes Peninsula are very different: there is few traffic along the roads (all unpaved except the one that crosses the Ameghino isthmus up to Puerto Piramides) and there are not service lines, except for some isolated structures close to the few small built-up areas. For these reasons, roads in continental areas appears more attractive than those in the Valdes Peninsula.

Lower abundance of individuals may be also due to the unproductive environment of the

Patagonian steppe, which results in a relatively low number of individuals and of species richness (Vuilleumier 1993, Pruscini et al. 2014). Particularly in the Valdes Peninsula, sheep grazing has severely restricted plant growth (Catorci et al. 2012) affecting the natural dynamics of the steppe, compromising the development of a food web capable to sustain a higher number of raptors. In fact, even although all the surveyed raptors are classified as Least Concern (BirdLife International 2015), the two species of the genus *Circus* are indicated by Ferguson-Lees and Christie (2001) as decreasing, precisely because of habitat degradation. This situation has been happening in the Valdes Peninsula since the end of the XIX century (Franklin 1982), when domestic livestock ranching practices were imported, mostly by European settlers, who introduced the domestic sheep (Adler et al. 2005, Chartier and Rostagno 2006, Bisigato et al. 2008). *Falco femoralis* is also among the species reported decreasing by Ferguson-Lees and Christie (2001), while *Geranoaetus polyosoma*, *Caracara plancus*, and *Milvago chimango* are classified as increasing. The population of *Caracara plancus* is suspected to be increasing owing to creation of suitable habitat through deforestation and increased cattle-ranching and sheep-rearing (Ferguson-Lees and Christie 2001), whereas the population of *Milvago chimango* is suspected to be increasing as it thrives in close proximity to humans and is commonly seen feeding at rubbish dumps and around towns and villages, especially fishing villages (del Hoyo et al. 1994).

In the light of those considerations, the results of our study, which provide the first information on the abundance of raptor species in the Valdes Peninsula, are important not only because they contribute to the knowledge of the avifauna of the peninsula, but also because data provide a strong base for future monitoring of raptor species, with the aim of track these species and for conservation purposes.

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