Client: YPF Energía Eléctrica S.A.

Location: Cañadón León – Santa Cruz Province

Date: May 15, 2017

Report: MAM 001/17

Survey of Birds and Bats
Cañadón León Wind Farm

Scudelati & Asociados
Asesores

Contents

1 STUDY AIMS

The general aim of this study is to monitor bird species in the area of Cañadón León Wind Farm (PECL) that may be susceptible to impact by the presence of wind turbines.

1.1 SPECIFIC AIMS

- To survey species richness and abundance of birds present at PECL.
- To record nesting in the PECL area.
- To record sites where birds of prey are sighted.

2 LIST OF PROFESSIONALS

This report on birds and bats was prepared by María Laura Muñoz Cadenas, Licentiate in Biological Science, who led the Scudelati & Asociados SA team that took part in it.

- Ambasch, Matías. Master in Environmental Management and Auditing. ID Document 26.128.194
- Fernández, Manuela. University Technician in Environment. ID Document 35.413.300. Field survey work.
- Roldan, Ana. Licentiate in Environmental Management. ID Document 32.423.181. Analysis of information recompiled in the field.
- Torero, Daiana. Environmental Impact Technician. ID Document 33.176.686
- Vargas Grace. Environmental Engineer. ID Document 95.688.745. Office work.

3 STUDY AREA

The study area is located within the Cañadón León Oilfield operated by the company YPF ENERGÍA ELÉCTRICA S.A. located 20 km SW of Caleta Olivia City, Santa Cruz (Figure 1). Approximate surface area is 18.7 sq. km., on which the construction of a total 30 wind turbines is planned.

References: Wind turbine.

Figure 1. Cañadón León Wind Farm Area

4 METHOD

Surveys were conducted on May 15 this year. Diversity and abundance were recorded at the Wind Farm site and in the area established as control (Stewart-Oaten *et al*., 1986.). The survey was performed under variable weather conditions (average wind speed 30 km/h; wind direction NW; mean temperature 14 °C; average humidity 37%) from 7:00 a.m. to 5:00 p.m.

The following materials were used for fieldwork: camera, binoculars, GPS, notebook, pencil, clock, map of the study area and bird guidebook for the study area.

Identifications were made based on Narosky & Izurieta (2011).

4.1 CENSUS OF DIVERSITY AND ABUNDANCE

Field survey method consisted of applying two types of census: walking transects and driving transects (Bibby et al., 2000).

Walking transects

Linear transects 200 m long were used, and along each one, any birds seen or heard within an identification strip of approximately 25 meters on either side of the transect were identified.

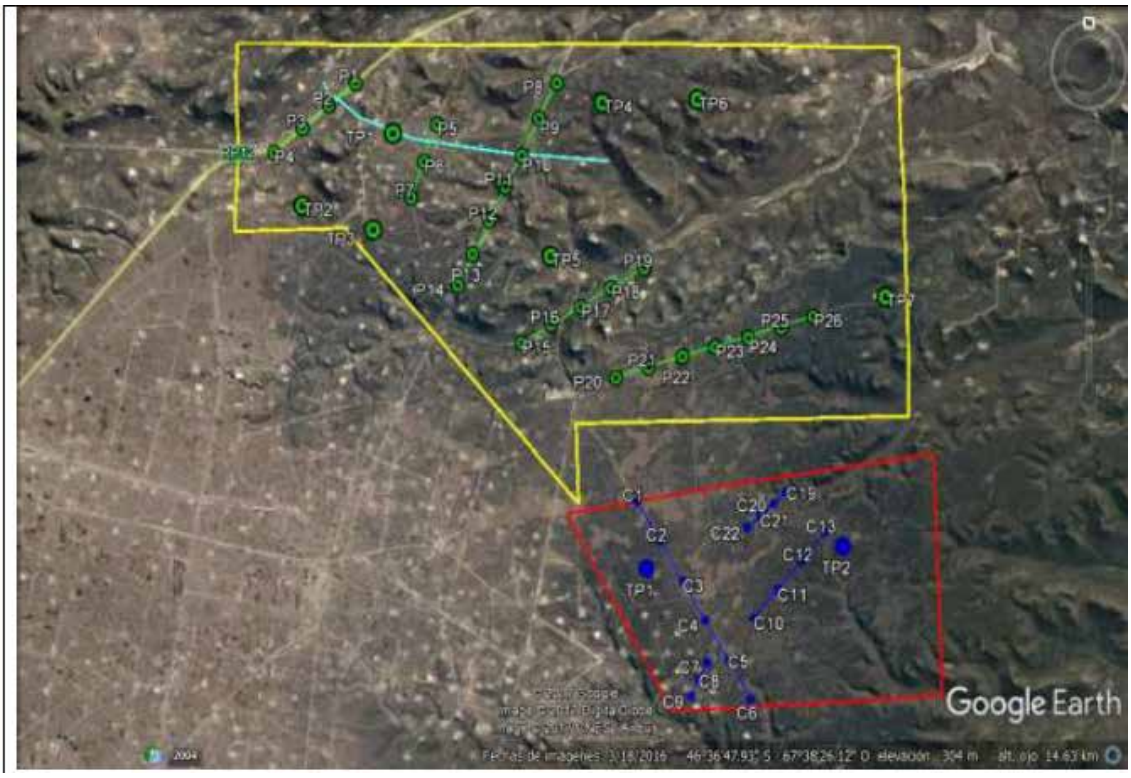
The following details were recorded for each species sighted or heard:

- Place
- Date
- Weather conditions
- Geographic position (GPS value, transect information)
- Species seen or heard
- Number of individuals
- Observations (information on adults, juveniles, breeding, feeding, etc.)

A total 7 walking transects were used within the PECL site, each of which was divided into 5 points, located every 50 meters, providing a total 35 points. Two furhter transects with 10 points each were used in the Control area (Figure 2).

Driving transects

Vehicles were driven in the study area along transects of different lengths with monitoring points every 500 meters, in order to complete the record of wild birds that may use the site but may not have been recorded during the walking transects, and to identify any nesting areas of birds of prey. Five transects with 26 monitoring points were used within the wind farm area and 4 driving transects with 22 points were used in the control area.



References:

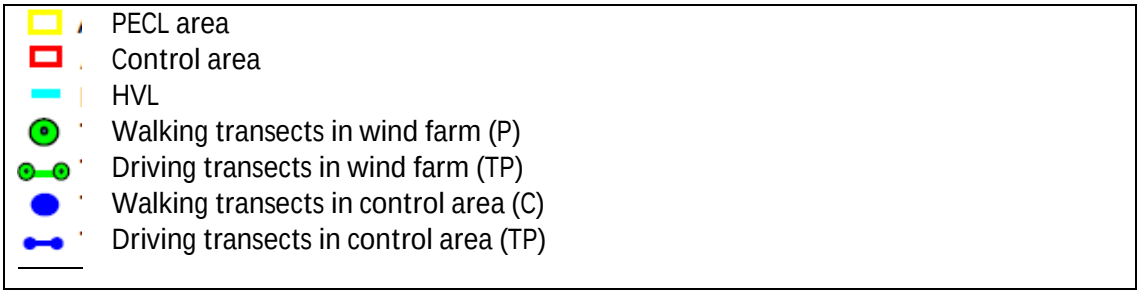


Figure 2. Survey transects.

4.2 NEST CENSUS

Presence/absence of nests was recorded along each diversity and abundance transect.

4.3 STUDY OF SITES USED BY BIRDS OF PREY

Throughout the census, in both the wind farm site and the control area, any birds of prey sighted were recorded along with their location. This data was used to prepare a map of sightings showing site use.

5 RESULTS

5.1 DIVERSITY AND ABUNDANCE

5.1.1 CENSUS OF THE PECL AREA

Along the transects in the PECL site, 12 species belonging to 2 orders – Falconiformes and Passeriformes – were identified. No bat specimen (Chiroptera) was observed.

The following tables show the species identified and sighting times (Tables 1 and 2).

Order	Species	Common name
FALCONIFORMES	*Buteo polyosoma*	Red-backed hawk
	Geranoaetus melanoleucus	Black-chested buzzard eagle
	Milvago chimango	Chimango caracara
PASSERIFORMES	*Asthenes pyrrholeuca*	Lesser canastero
	Lessonia rufa	Rufous-backed negrito
	Mimus patagonicus	Patagonian mockingbird
	Passer domesticus	House sparrow
	Phrygilus carbonarius	Carbonated sierra-finch
	Phrygilus fruticeti	Mourning sierra-finch
	Sturnella loyca	Long-tailed meadowlark

	Upucerthia dumetaria	Scale-throated earthcreeper
	Zonotrichia capensis	Rufous-collared sparrow

Table 1. Taxonomical list of species identified in the PECL area.

No.	Species		Time of day	
	Scientific name	**Common name**	**Morning**	**Afternoon**
1	*Asthenes pyrrholeuca*	Lesser canastero	x	
2	*Buteo polyosoma*	Red-backed hawk		x
3	*Geranoaetus melanoleucus*	Black-chested buzzard eagle	x	
4	*Lessonia rufa*	Rufous-backed negrito	x	x
5	*Milvago chimango*	Chimango caracara	x	x
6	*Mimus patagonicus*	Patagonian mockingbird		x
7	*Passer domesticus*	House sparrow	x	
8	*Phrygilus carbonarius*	Carbonated sierra-finch	x	x
9	*Phrygilus fruticeti*	Mourning sierra-finch	x	x
10	*Sturnella loyca*	Long-tailed meadowlark	x	
11	*Upucerthia dumetaria*	Scale-throated earthcreeper		x
12	*Zonotrichia capensis*	Rufous-collared sparrow	x	x

Table 2. Species identified in the PECL area according to time of day.

The following table shows the number of individuals recorded per transect (Table 3)

Species	Transect #												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Asthenes pyrrholeuca					1	1			1	1			4
Buteo polyosoma						1				1			2
Geranoaetus melanoleucus				1					1				2
Lessonia rufa				1		4			4		5		14
Milvago chimango					1		1		1		1	1	5
Mimus patagonicus			1	1		1	1		1	1		1	7
Passer domesticus		1		3	6	4	5	5		15	5		44
Phrygilus carbonarius				1		3			5		3	2	14
Phrygilus fruticeti			1			2		3		4	2	5	17
Sturnella loyca				1		1		1	1	1	1	1	7
Upucerthia dumetaria				1		1			1	1	1	1	6
Zonotrichia capensis	3		3	6		10		6	8		10	10	60
Total	3	1	5	13	8	28	7	15	23	20	28	21	**178**

Table 3. Abundance of individuals per species and per transect in the PECL area.

Transects 6, 9, 10, 11 and 12 had values higher than 20 individuals counted, with transects 6 and 11 having the maximum values, 28 individuals. The species that contributed the greatest number to total individuals were *Zonotrichia capensis* (60), followed by *Passer domesticus* (44) and *Phrygilus fruticeti* (17). A total 178 individuals were counted during the census for the PECL area.

The following figure (Figure 3) shows total species and number of individuals per transect.

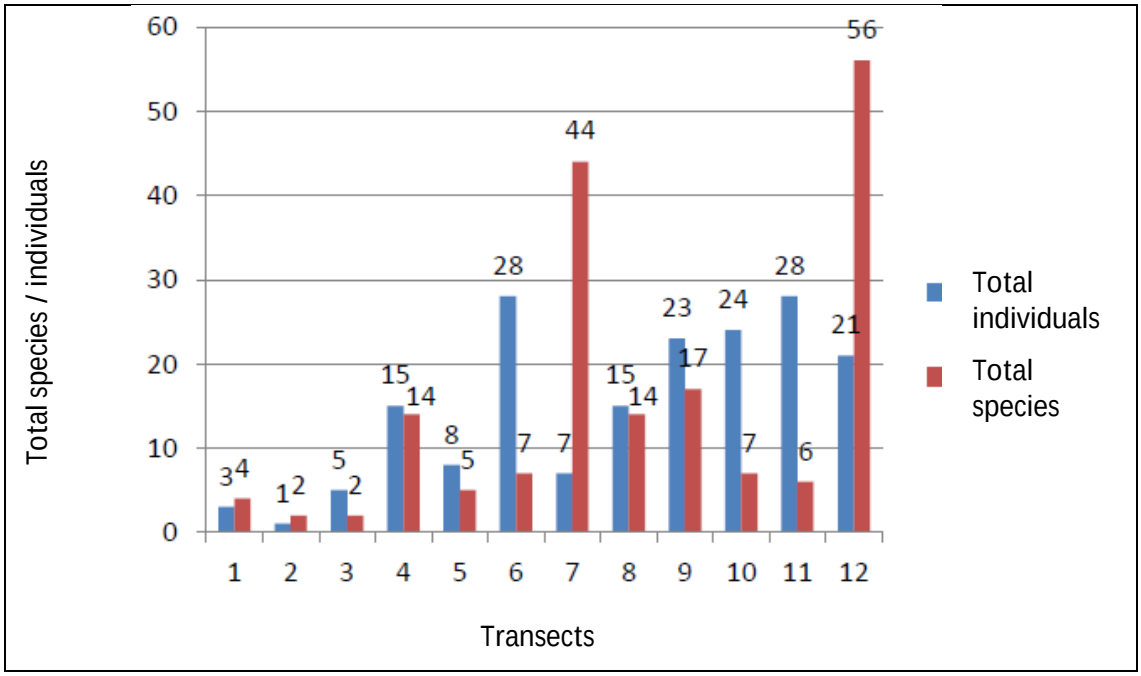


Figure 3. Bar chart showing distribution of species and abundance per transect in the PECL area. Shannon's diversity index (H) for the wind farm area was low (H=1.09), as expected for this kind of environment.

5.1.2 CONTROL AREA CENSUSES

A total 6 species, belonging to 2 orders, were recorded in the control area.

The following tables (Tables 7, 8 and 9) show the species identified.

Order	Species	Common name
FALCONIFORMES	*Milvago chimango*	Chimango caracara
PASSERIFORMES	*Lessonia rufa*	Rufous-backed negrito
	Phrygilus carbonarius	Carbonated sierra-finch
	Phrygilus fruticeti	Mourning sierra-finch
	Sturnella loyca	Long-tailed meadowlark
	Zonotrichia capensis	Rufous-collared sparrow

Table 7. Taxonomical list of species identified in the control area.

No.	Species		Time of day	
	Scientific name	Common name	Morning	Afternoon
1	*Milvago chimango*	Chimango caracara	x	x
2	*Lessonia rufa*	Rufous-backed negrito	x	x
3	*Phrygilus carbonarius*	Carbonated sierra-finch	x	
4	*Phrygilus fruticeti*	Mourning sierra-finch		x
5	*Sturnella loyca*	Long-tailed meadowlark		x
6	*Zonotrichia capensis*	Rufous-collared sparrow	x	x

Table 8. Species identified in the control area according to date.

Species	Transect #						Total
	1	2	3	4	5	6	
Milvago chimango	1				1		2
Lessonia rufa	1		2			1	4
Phrygilus carbonarius		1			1		2
Phrygilus fruticeti	1		3	3	1	2	10
Sturnella loyca		1					1
Zonotrichia capensis	5	4	2	3	4	5	23
Total	8	6	7	6	7	8	**42**

Table 9. Abundance of individuals per species and per transect in the control area

A total 42 individuals were counted for the control area during the census. Most of the individuals were recorded on transects 1, 3 and 6. The species that contributed the greatest number to total individuals were *Zonotrichia capensis* (23), followed by *Phrygilus fruticeti* (10). With regard to total species, the transects with greatest abundance were 1 and 6.

The following figure (Figure 4) shows total species and number of individuals per transect.

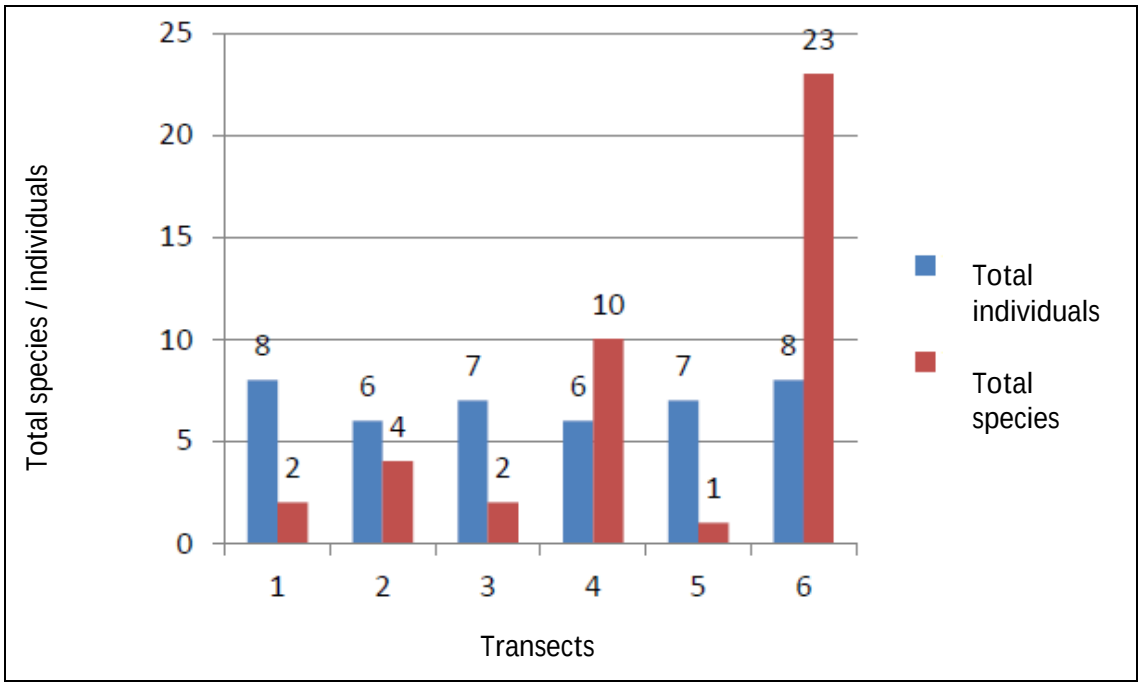


Figure 4. Bar chart showing distribution of species and abundance per transect in the control area.

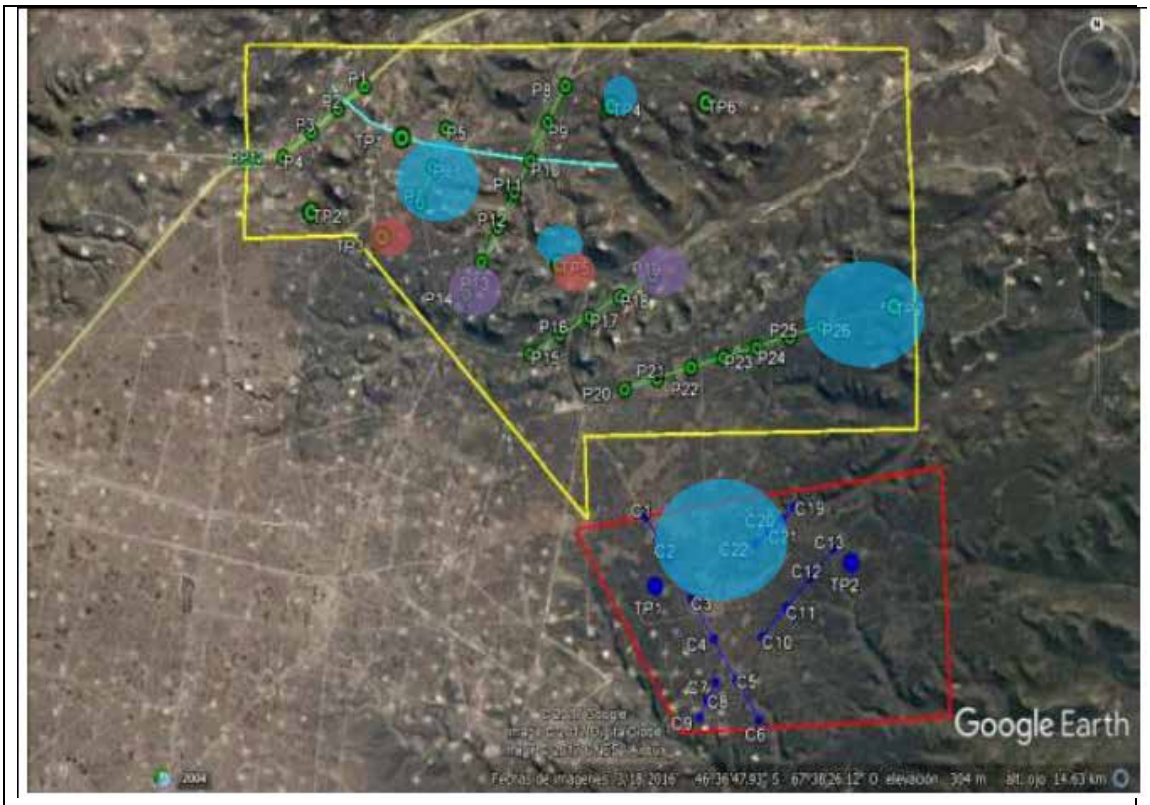
Shannon's diversity index (H) for control area 3 was slightly lower than for the PECL area (H=0.96); nevertheless, it is still low, as expected for this kind of environment.

5.2 NESTING

No nests and/or eggs of the identified species were observed during the surveys.

5.3 OBSERVATION OF BIRDS OF PREY

During the surveys, 3 species of birds of prey were recorded: red-backed hawk (*Buteo polysoma*), black-chested buzzard-eagle (*Geranoaetus melanoleucus*) and chimango caracara (*Milvago chimango*). The following map shows the observation points in the PECL and control areas, including radius of action for each.



REFERENCES:
Black-chested buzzard-eagle (*Geranoaetus melanoleucus*)
Red-backed hawk (*Buteo polysoma*)
Chimango caracara (*Milvago chimango*)

Figure 7. Birds of prey recorded in the PECL area and area of direct influence.

5.4 MIGRATORY BIRDS

The following 5 species of migratory birds were recorded during the census:

Family	Scientific name	Common name	Migratory habit
Canasteros	*Asthenes pyrrholeuca*	Lesser canastero	Migrator C
Phylloscartes	*Lessonia rufa*	Rufous-backed negrito	Migrator C
Mimus	*Mimus patagonicus*	Patagonian mockingbird	Migrator C
Phrygilus	*Phrygilus carbonarius*	Carbonated sierra-finch	Migrator C
Earthcreepers	*Upucerthia dumetaria*	Scale-throated earthcreeper	Migrator C

Table 13: Migratory species recorded

Migrator C: According to Narosky, T and Yzurieta, D., 2006, these species are Migrator C type, which means that they nest in Patagonia (in spring and summer) and are found in the center of the country or further north in autumn and winter.

6. CONCLUSIONS

- During this survey, total species richness was 12 bird species, distributed along 4 monitoring transects, with total abundance 178 specimens in the PECL area. No bat (Chiroptera) species were observed.
- Bird diversity and abundance at the wind farm site are as expected for the time of year and environment.
- Although total species and abundance were lower in the control area, 100% of the species found there were also identified at the PECL site.
- With regard to migratory routes, this survey provides a baseline for establishing potential migratory routes of the species *Asthenes pyrrholeuca (*Lesser canastero), *Lessonia rufa (*Rufous-backed negrito), *Mimus patagonicus (*Patagonian mockingbird), *Phrygilus carbonarius (*Carbonated sierra-finch) and *Upucerthia dumetaria (*Scale-throated earthcreeper), which use the site during migration.
- For birds of prey identified, although the density of individuals was low, diversity for the zone was high.
- No species with critically endangered, vulnerable or near-endangered conservation status was found, according to the ICUN Red List of Threatened Species 2017; López Lanús, B.P. (2008).
- No species with critically endangered, endangered, threatened or vulnerable conservation status was found, according to López Lanús, B. P. (2008) "*Categorización de las aves de la Argentina según su estado de conservación".* Santa Cruz: Aves Argentinas /AOP y Secretaría de Ambiente y Desarrollo Sustentable.

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WEBSITES

- www.aba.org
- web.catie.ac.cr/pma
- www.biomonitoreo.org
- www.proaves.org

8. APPENDICES

Survey index cards for frequent species found on the monitoring transects are provided below.

Field survey index card	
Scientific name: *Aesthenes pyrrholeuca* **Common name:** Lesser canastero **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: Measures approximately 15 cm. Shy. Hidden. Flight short and low, diving into vegetation. Long tail (not held erect), fluttering in flight. Orange throat spot. Bill thin. Inhabits shrubby and Patagonian steppes, marsh vegetation and open areas of Araucano forest.	

Field survey index card	
Scientific name: *Buteo polysoma* **Common name:** Red-backed hawk **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 54 cm and weights 3 kg approximately. Perched, wings not longer than tail white with subapical band black. Back grey in male, rufous in female. Belly white. Bars on flanks. Variety of plumage. Feeds on rodents, small birds and insects. Lives in environments such as open forests, shrubbery and steppes.	

Field survey index card	
Scientific name: *Geranoaetus melanoleucus* **Common name:** Black-chested buzzard-eagle **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures about 70 cm. Breast finely barred, wings, back, neck and head grey. Juveniles speckled brown. Bird d of prey that feeds on mammals such as rabbits, hares, skunks and southern vizcachas; birds such as guans, and also on carrion. Lives in areas with predominantly low vegetation.	

Field survey index card	
Scientific name: *Lessonia rufa* **Common name:** Rufous-backed negrito **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: Measures about 11 cm. Feeds on small invertebrates and eggs. Lives in open areas, preferably with short grasses and usually in low-lying, humid areas.	

Field survey index card	
Scientific name: *Milvago chimango* **Common name:** Chimango caracara **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 37 cm. Often on roads, scavenging. Screech *yay*... Smaller than the southern crested-caracara, paler (lacks crest) and in flight neck seems shorter. Brown. Underparts buffy (barred in S). Whitish tail with slight barring and blackish band on tip. Buffy patch on wing. Whitish legs. Juvenile: whitish wing-bars. Feet sky-blue. Several habitats.	

Field survey index card	
Scientific name: *Mimus patagonicus* **Common name:** Patagonian mockingbird **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: About 22 cm tall. Plain back. Two conspicuous dotted white bars on coverts. Tail shortish with white tip. Underparts buffy-ochre. Andean and Patagonian shrubby steppes. Southern population is Migrator C.	

Field survey index card	
Scientific name: *Phrygilus carbonarius* **Common name:** Carbonated sierra-finch **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: Measures about 15 cm and weighs about 23 grams. Male with back dark grey streaked with black; underparts, wings and tail black. Bill and legs yellow. Female's back brownish grey streaked with dark brown. Breast streaked, underparts white. Pale eye-ring. Feeds on seeds and grain. Lives in semi-open shrubby steppes.	

Field survey index card	
Scientific name: *Phrygilus fruticeti* **Common name:** Mourning sierra-finch **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 15 cm. nasal *pir…piri..piii…piripi* when perched or during display, gliding with wings below horizontal. Blackish. Juvenile: dark brown. Dorsal streaking; breast, wings and tail black. Wing coverts edged in white. Rest of underparts whitish. Bill and legs orange. Female: brownish-grey, streaked black. White moustache. Lives in Andean and Patagonian steppes.	

Field survey index card	
Scientific name: *Sturnella loyca* **Common name:** Long-tailed meadowlark **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 22 cm. screaming song with warbles, whistles and nasal notes, from low perch. White eyebrow, red at origin. Underwing coverts white. Female: white throat with black on sides. Lives in Andean, Patagonian and mountain grasslands and steppes.	

Field survey index card	
Scientific name: *Upucerthia dumetaria* **Common name:** Scale-throated earthcreeper **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: Height about 23 cm. Modest coloring and noticeable long, curved bill. Feathers greyish-brown with throat and underparts whitish with conspicuous "scaled" appearance. Feeds on insects, spiders, scorpions and other invertebrates. Nests in caves, banks and gullies. Widely distributed in the region, throughout the extra-Andean zone.	

Field survey index card	
Scientific name: *Zonotrichia capensis* **Common name:** Rufous-collared sparrow **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 12 cm. One of the most widely known small birds. Half-crest, base grey continuing in a black line below and a white supercilium; cheeks darker grey; throat and underparts white; half-collar black with some reddish; back mottled black and cinnamon. Juvenile: without grey or cinnamon, underparts streaked black. Lives in almost all habitats, including inhabited areas.	