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Ecology and behavior of southern South American Cinereous Harriers, *Circus cinereus*

Ecología y conducta de los varis del sur de Sudamérica, *Circus cinereus*

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ABSTRACT

We report field observations made in Torres del Paine National Park, southernmost Chile, on the ecology and behavior of breeding Cinereous Harriers *(Circus cinereus)*, and summarize scattered information on the biology of this species. Information is presented and discussed on: taxonomy, morphology, distribution, habitat, migration, abundance, status, reproduction, behavior, and diet. Reproductive aspects of the population studied are documented with emphasis on behavior; 1620 min of observations on prey transport and transfer are analyzed quantitatively. The first quantitative assessment of the Cinereous Harrier's diet is also presented, based on 1259 prey items identified among 413 regurgitated pellets collected in the study site: 33.6% of the prey (by number) was insects, 27.2% birds, 19.1% each, mammals and reptiles, and 1.0% arachnids. The biomass contribution to the diet, however, follows a decreasing order from birds, through mammals, reptiles, insects, and to arachnids.

Key words: Cinereous Harrier, *Circus cinereus*, Chile, Argentina, taxonomy, morphology, distribution, habitat, migration, abundance, status, reproduction, behavior, diet.

RESUMEN

Se documentan observaciones de terreno realizadas en el Parque Nacional Torres del Paine, en el extremo sur de Chile, sobre la ecología y conducta reproductiva del vari *(Circus cinereus)* y se resume la información dispersa sobre la biología de esta especie. Se presenta y discute información sobre taxonomía, morfología, distribución, hábitat, migración, abundancia, status de conservación, reproducción, conducta y dieta. Los aspectos reproductivos de la población estudiada se documentan con énfasis en la conducta; 1620 min de observaciones sobre transporte y transferencia de presas se analizan cuantitativamente. También se presenta la primera evaluación cuantitativa de la dieta del vari, basada en 1259 ítemes presa identificados en 413 regurgitados colectados en el sitio de estudio: numéricamente, 33,6% de las presas fueron insectos, 27,2% fueron aves, 19,1% fueron mamíferos y otro tanto reptiles, y 1,0% fueron arácnidos. Sin embargo, la contribución de biomasa de presas a la dieta del vari va en orden decreciente desde aves, a mamíferos, a reptiles, a insectos y arácnidos.

Palabras claves: Vari, *Circus cinereus*, Chile, Argentina, taxonomía, morfología, distribución, hábitat, migración, abundancia, status de conservación, reproducción, conducta, dieta.

INTRODUCTION

The biology of harriers of the genus *Circus* is relatively well known in the northern hemisphere, particularly through the comprehensive field works of Hamerstrom (1986 and references therein) in the United States, of Simmons *et al.* (1987) in Canada, of Watson (1977) in the British Isles, of Schipper in the Netherlands and France (*e.g.*, Schipper 1977), and of Hiraldo *et al.* (1975) in Spain. Research on *Circus* biology in the southern hemisphere has lagged behind, with contributions made only recently by Baker-Gabb (1984a, 1984b, 1986, and references therein) in Australia and New Zealand. Virtually nothing is known on the biology of South American *Circus*, despite their wide distribution and local abundance.

During a visit to Torres del Paine National Park in southernmost Chile, we found Cinereous Harriers *(Circus cinereus)* that were spatially restricted and locally abundant, facilitating detailed observations on their breeding ecology and behavior. We report the information that we gathered in our study site at Torres del Paine National

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Park, highlighting reproduction and the first quantitative data about diet of the Cinereous Harrier. In addition, we conducted a literature survey on this species, which revealed interesting observations by ornithologists in widely scattered publications. We pooled all the data available on Cinereous Harriers from little-known and sometimes very old Chilean and Argentine books and journals.

MATERIAL AND METHODS

Observations and collection of material occurred between 26 and 31 December 1984 (austral early summer) in Torres del Paine National Park (*ca.* 51°S, 74°W), located 142 km N of Puerto Natales. Pisano (1973, 1974) detailed the climate, geology, orography, edaphology and phytogeography of the Park. Our study site was a marsh of 1500 x 400 m composed of four shallow lagoons of average diameter below 80 m. The vegetation was dominated by reeds *(Scirpus californicus)*, not exceeding 1 m height; outside the marsh the vegetation was a steppe composed of bunchgrasses *(Stipa* sp.) and shrubs *(Berberis* sp., *Mulinum* sp.) not exceeding 1.5 m. Apart from Cinereous Harriers, other conspicuous nesting birds were *Podiceps rolland* (Podicipedidae), *Theristicus caudatus* (Threskiornithidae), *Chloephaga picta, Lophonetta specularioides, Anas flavirostris, Anas sibilatrix, Oxyura jamaicensis* (all Anatidae), *Milvago chimango* (Falconidae), *Fulica armillata* (Rallidae), *Vanellus chilensis* (Charadriidae), and *Agelaius thilius* (Emberizidae).

Observations of Cinereous Harriers were made from the periphery of the marsh with binoculars (10 x 25), during five consecutive days, almost continually between 0645 and 2115. Special attention was given to prey transport, recording sex of the harrier, hour of day, and transfer of prey between males and females. Prey was identified mainly to the order or class level (*e.g.*, bird, rodent, lizard). The marsh was surveyed in parallel transects separated by 10 m (first, north to south; later, east to west) to locate nests and make observations. The position of nests was recorded, as was their content. Eggs were counted, measured with a ruler (precision 1 mm), and weighed with a Pesola scale (precision 1 g); nestlings were weighed, and their crops examined for prey. Regurgitated pellets were measured with a ruler, and their contents were identified. Two adult Cinereous Harriers (a male and a female) were captured with a mist net, their weight recorded and their total wing area measured.

RESULTS AND DISCUSSION

Taxonomy

The Cinereous Harrier has been regarded as a distinctive species, except by Hellmayr & Conover (1949) who considered it a subspecies of the Marsh Harrier *C. cyaneus*. Amadon (1961) compared Cinereous and Marsh Harriers and concluded that they were different species. Vuilleumier (1985) considered *C. cinereus* as a South American allospecies of the superspecies *C. cyaneus*.

Morphology

General descriptions of plumage were reported by Johnson (1965), Brown & Amadon (1968), Humphrey *et al.* (1970), and Meyer de Schauensee (1982). Morphometric features of Cinereous Harriers are summarized in Table 1. Data on the two adult birds captured by us in Torres del Paine National Park agree well with those reported in the literature for wing and tail length, but not for weight, which in our case is rather small for the male and rather large for the female. To our knowledge, the data on total wing area, and linearized wing loading are the first ever reported for the species. The latter figures are slightly lower than those reported for the larger sized *C. cyaneus* (Jaksić & Carothers 1985).

Distribution

The Cinereous Harrier is distributed along the Andean Ranges, and on the lowlands west from 25°S, east from 32° southwards to Tierra del Fuego and the Falkland Islands (Dabbene 1902, Meyer de Schauensee 1982). This distribution encompasses the following South American countries: by the north from Colombia through Chile and Argentina to Tierra del Fuego (shared by Chile and Argentina) and east through Bolivia, Paraguay, Uruguay, to southeast Brazil (Vigil 1973, Meyer de Schauensee 1982). In the Chilean and Argentine Patagonian region

TABLE 1

Morphometric features of Cinereous Harriers as reported by different sources.
Características morfométricas de los varis según documentan distintas fuentes.

Morphometric features	Males		Females		Sources
Total length (average, mm)	400	(n = ?)	500	(n = ?)	a b c d e
Wing length (range, mm)	297 – 342	(n = ?)	345 – 371	(n = ?)	f
Wing length (mean ± SD, mm)	321.8 ± 6.5	(n = 6)	359.0 ± 4.5	(n = 5)	a
Wing length (mm)	322	(n = 1)	358	(n = 1)	h
Total wing area (cm^2)	1,267	(n = 1)	1,690	(n = 1)	h
Linearized wing load	0.192	(n = 1)	0.194	(n = 1)	h i
Tail length (range, mm)	204 – 253	(n = ?)	230 – 282	(n = ?)	f
Tail length (mean ± SD, mm)	223.0 ± 7.0	(n = 6)	250.8 ± 8.0	(n = 5)	a
Tail length (mm)	205	(n = 1)	246	(n = 1)	h
Weight (range, g)	340 – 354	(n = 2)	482	(n = 1)	g
Weight (g)	320	(n = 1)	510	(n = 1)	h

a = Goodall *et al.* (1957); b = Nores & Yzurieta (1980); c = Olrog (1984); d = Araya & Millie (1986); e = Narosky & Yzurieta (1987); f = Brown & Amadon (1968); g = Humphrey *et al.* (1970); h = This paper; i = See formula in Jaksić & Carothers (1985).

the Cinereous Harrier is a lowland bird but it becomes a mountain bird in the more northern parts of its range (Amadon 1961, Brown & Amadon 1968). It is said to be common around Lake Titicaca in the Bolivian high plateau (Brown & Amadon 1968).

In Argentina the Cinereous Harrier is found throughout the country (Hudson 1984, Narosky & Yzurieta 1987), from sea level up to 3500 m elevation (Amadon 1961, Olrog 1984, Olrog & Capllonch 1986). In Chile, the Cinereous Harrier occurs in suitable habitats as a resident nesting species almost anywhere (Araya & Millie 1986), from Copiapó to the Strait of Magellan (according to Hellmayr 1932) and to Tierra del Fuego (according to Johnson 1965). It is a resident bird in the continental part of Magallanes Region of southernmost Chile (Markham 1971, Venegas & Jory 1979), and also across the Strait of Magellan, in Tierra del Fuego Island (Humphrey *et al.* 1970). Our study site in Torres del Paine National Park is within the known distributional range of the Cinereous Harrier.

Habitat

In Rio Grande do Sul (southeastern Brazil) the Cinereous Harrier inhabits marshes and open country (Belton 1984). In Argentina it occurs along muddy streams in southeastern Buenos Aires Province (Hussey 1916), and in marshes, lagoons, streams and surrounding fields in Córdoba Province, often far from water (Nores & Yzurieta 1980). According to Hudson (1984), the Cinereous Harrier prefers treeless open country, and according to Olrog (1984), turfs and marshes. In the Argentine Patagonia it has been reported not in grasslands but in scrub, particulary in sedge, a mixture of grassland with *Berberis* shrubs and small trees (Ralph 1985).

In Chile the Cinereous Harrier is reported to occur in marshes, open country and prairies (Goodall *et al.* 1957, Johnson 1965), and in lowlands and marshy areas vegetated by reeds (Araya & Millie 1986). In continental Magallanes (southernmost Chile) it is found in marshes and swampy areas, particularly so in the steppe, but also inside sparse forests and shrublands (Markham 1971, Venegas & Jory 1979). Across the Strait of Magellan, in Tierra del Fuego, it is said to be "a constant feature in the landscape of open country, especially in lowland marshes, swampy plains, and wet grasslands" (Humphrey *et al.* 1970). The habitat features of our study site in Torres del Paine National Park agree with previous reports from the region.

Migration

The Cinereous Harrier is a resident bird along the Andean Ranges from Colombia to Tierra del Fuego and the Falkland

Islands, but migrates north to northern Argentina, Bolivia, Paraguay, and to southern Brazil during the austral winter (Olrog 1984). In Rio Grande do Sul (Brazil) the Cinereous Harrier arrives from Argentina during the winter (Belton 1984). Around the Río de la Plata region in Argentina (Buenos Aires Province) some individuals winter but others cross the area in apparent migration during fall and spring (Hudson 1984).

In Chile, southern birds (singly or in groups) migrate northwards during the winter (Housse 1945). According to Bullock (1929), they congregate in loose flocks (15-20 individuals) during winter in Angol, southern Chile. In the Magallanes region the Cinereous Harrier migrates locally during winter moving toward the east and north, reaching the seaside where the temperatures are more benign (Venegas & Jory 1979). Humphrey *et al.* (1970) have records of this bird in Tierra del Fuego in all seasons except winter, but they did not know whether it was a permanent resident or a summer breeder. We did not observe harriers in Torres del Paine National Park year-round, but park ranger Gladys Garay told us that when the marsh is covered by snow during winter, the harriers leave the area.

Abundance

The Cinereous Harrier is rare in Brazil's Rio Grande do Sul (Belton 1984), but it is locally common throughout Argentina (Olrog 1984). In Buenos Aires Province it is more abundant than *C. buffoni* (Narosky & Yzurieta 1973). The Cinereous Harrier is scarce in Córdoba Province, but numbers increase during fall and winter when "dozens of individuals" congregate around lagoons (Nores & Yzurieta 1980). The Cinereous Harrier is more common in Patagonia and the Falkland Islands than elsewhere in Argentina (Narosky & Yzurieta 1987). Next to the Chimango Caracara *(Milvago chimango)* it is the most common raptor in the Patagonian steppes (Hudson 1984), but there must be local differences because the Cinereous Harrier is reportedly uncommon in *Festuca* steppes of northern Patagonia (south-central Argentina 39°-41° S), and rare in *Nothofagus* steppes (Vuilleumier 1972). Indeed, fewer than 0.05 birds per hectare have been reported in northern Patagonia (Bariloche area), and only in sedge (Ralph 1985).

In central Chile the Cinereous Harrier is relatively abundant, but it is scarce in the north and south (Hellmayr 1932, Goodall *et al.* 1957, Johnson 1965). However, it becomes common again in open country of the XI Region of Aysén, and of the XII Region of Magallanes (pers. obs.), particularly so in Tierra del Fuego (Humphrey *et al.* 1970). The Cinereous Harrier is a breeding resident from Copiapó south, and an occasional visitor in the Chilean altiplano region (Jaksić & Jiménez 1986). In our study site at Torres del Paine National Park there was a minimum of 12 adult birds and one immature in an area of 60 hectares of marsh (= 0.22 individuals/ha).

Status

Olrog (1979) believed that the Cinereous Harrier had declined in historical times in both central and southern Argentina. Housse (1945) thought that the Cinereous Harrier had declined in central Chile, where he regarded it as a harmful bird (apparently because it eats songbirds). However, Johnson (1965) considered that this bird is "wholly beneficial to agriculture and deserving of full protection". Jaksić & Jiménez (1986) reported that the Cinereous Harrier is rare in northermost Chile, frequent but decreasing in central and southern Chile, and abundant and increasing in southernmost Chile. They considered that its decrease is associated with decreasing habitat availability for breeding and feeding, and its increase with the opposite phenomenon.

Indeed, Jaksić & Jiménez (1986) reported for the Magallanes region that "*Circus cinereus*, a known predator of lizards in the region may have thus been affected by a reduction in its food supply, but this has been compensated by the increase in favourable habitat through the clearing of Magallanes forests". We have seen harriers in our study site at Torres del Paine during visits made in 1981, 1982, 1983, and 1984, and have been told that they still persist there as of January 1988 (Warren Johnson, pers. comm.). Consequently, the harrier population has remained in that area with viable numbers during the last 8 years, but we have no quantitative information to report, except for 1984.

TABLE 2

Reproductive features of Cinereous Harriers as reported by different sources.
Características reproductivas de los varis según documentan distintas fuentes.

Reproductive features	Reports		Sources
Breeding season:	October - January		a d g
	November - December		b e f
Incubation period (range, days):	18–19		g
Nest external diameter (cm):	30	(n = ?)	a
	32	(n = ?)	c g
	35–50	(n = 14)	h
Nest depth (cm):	22	(n = ?)	c
	10	(n = ?)	g
Nest cup diameter (cm):	13	(n = ?)	c
Nest cup depth (cm):	6	(n = ?)	c
	5	(n = ?)	g
Clutch size (range):	3	(n = ?)	a
	3–4	(n = ?)	b d e f g
	1–5	(n = 14)	h
Egg length x width (mean ± SD, mm):	45.0 x 35.0	(n = ?)	b
	44.2 – 46.3 x 34.1 – 34.2	(n = 3)	c
	45.8 ± 0.3 x 35.4 ± 0.2	(n = 40)	e f
	45.5 x 34.0	(n = 24)	g
	41.2 ± 1.0 x 32.1 ± 0.8	(n = 9)	h
Egg weight (mean ± SD, g)	25.3 ± 2.4	(n = 10)	h
Nestling weight (range, g):	22.5 – 420.0	(n = 40)	h

a = Nores & Yzurieta (1980); b = Vigil (1973); c = Narosky & Yzurieta (1973); d = Bullock (1929); e = Goodall *et al.* (1957); f = Johnson (1965); g = Housse (1945); h = This paper.

Reproduction

Reproductive features of Cinereous Harriers in Chile and Argentina are summarized in Table 2. In Argentina, according to Nores & Yzurieta (1980) and Narosky & Yzurieta (1973), the Cinereous Harrier nests on the ground among reeds and tall grasses, where it builds a nest made with reed stems and lined with reed shreds, and where it lays its eggs: white, spotless and with a slight blue-greenish hue. Vigil (1973) stated that nesting occurs on the ground at the base of a shrub or bunchgrass in dry areas or in reeds in marshy areas, and that the eggs are white with a bluish hue and without spots, thus concurring with Nores & Yzurieta (1980). According to Hudson (1984), however, the eggs are white but with red spots. Apparently, there is a polymorphism in egg coloration, spotless eggs prevailing (see below).

In Chile, according to Bullock (1929), the Cinereous Harrier nests in marshes and pastures. According to Goodall *et al.* (1957) and Johnson (1965) it nests on the ground in marshes or in wheat or barley fields close by, building a well hidden spacious platform of rushes or grasses and lining this with softer vegetable material or sometimes a few feathers. These same authors reported that the eggs are 3 or more frequently 4, seldom layed before November or December, "a good two months later than most raptors". The eggs "are unexpectedly small for the size of the bird" (see Table 2), and only the female incubates but both parents procure food for hatchlings. According to Housse (1945) the pair forms in October, but some as late as January, often laying two clutches always on the ground in alfalfa, clover, and tall grass; the nesting platform is placed not directly on the ground but some 10 cm above ground on a grass clump. This author also reported that 4 eggs, of which one is often sterile, are layed; of 24 eggs examined only one had light brownish spots; the female incubates and is reluctant to abandon the eggs or hatchlings despite human disturbance; chicks are first fed small frogs, lizards, and other birds' hatchlings, but by

the end of the second week their diet is supplemented with small rodents; by the end of the first month the birds fledge.

In the marsh at Torres del Paine National Park we observed a maximum of four adult males, eight adult females, and one immature bird at any one time. However, we found 14 active nests and thus apparently did not detect some females. All 14 nests were in the eastern part of the marsh, hidden among reeds, 10 to 30 cm above the water level. They were all made of reed stems, were flat and compact, and their interior was infrequently lined with dry grass (no greenery or feathers were observed). Nests were spaced somewhat uniformly at no less than 25 m from each other. A total of 10 eggs and 40 nestlings were found. The following frequency distribution of "clutch" sizes was calculated using eggs and nestlings: 1 (once), 3 (five times), 4 (six times), and 5 (twice). In comparison to previous reports, our figures for nest diameter and clutch size are more variable, and those for egg size are the smallest (Table 2). Egg and nestling weights are here provided for the first time (Table 2). The ratio between the largest and smallest sibling ranged between 1.2 and 6.9. In the two cases of maximum ratios (6.9 and 3.5) the smallest siblings appeared weakened and with signs of having been pecked by their larger siblings; one of these small nestlings was found dead on the second day of observation.

Behavior

In Chile the Cinereous Harrier has been reported to hunt from daybreak to dusk (Johnson 1965), at any time of the day, flying higher during midday (Housse 1945). In Tierra del Fuego it is active all day long, scouring marshes for rodents and lizards (Humphrey *et al.* 1970). Our observations in Torres del Paine National Park are in agreement with previous statements.

In Argentina, the movements of the Cinereous Harrier are sluggish in comparison to *C. buffoni* (Hussey 1916). According to Narosky & Yzurieta (1973) it perches on the ground more frequently than *C. buffoni,* and defends the nesting area frequently against its larger congener, *C. buffoni.* The Cinereous Harrier flies continuously in search of prey, hunts singly or in pairs, and congregates for roosting. It perches almost exclusively on the ground, and it is very aggressive, particularly during breeding (Nores & Yzurieta 1980). According to Hudson (1984), the Cinereous Harrier flies low and slowly, and flushes birds from the ground vegetation and captures them in flight. It devours prey on the ground, never on trees. It does not perch on shrubs either, and it is able to fly in very windy days (Vigil 1973). According to Wetmore (1926) the Cinereous Harrier is mobbed by the Yellow-winged Blackbird (*Agelaius thilius*). Vigil (1973) stated that the Cinereous Harrier vocalizes only during the breeding season, that during incubation the flying male transfers prey to the incubating female, and that fledglings walk around the nest before attempting to fly. Narosky & Yzurieta (1973) reported that during incubation the male becomes aggressive toward humans; and that the female takes prey from the male by approaching it on the wing.

In Chile, the reports also indicate that the flight of the Cinereous Harrier is slow and buoyant with frequent hovering bouts (Araya & Millie 1986), and bankings for closer examination of the ground below (Goodall *et al.* 1957, Johnson 1965, Venegas & Jory 1979). According to Housse (1945), it catches birds in flight, but eats its prey on the ground, very rarely on a fence post; it hunts by ear as well as by sight (no supporting evidence is given for this claim, but see Rice 1982). In Tierra del Fuego the Cinereous Harrier quarters the ground in leisurely zig-zag fashion, about 5-7 m above ground; "no matter how tearing the wind it remains on the wing when hardly another bird will stir from shelter" (Humphrey *et al.* 1970). Housse (1945) stated that Cinereous Harriers may nest close together without aggression. Similarly, we found that in Torres del Paine National Park the harriers were not aggressive towards each other, but they attacked humans (Jiménez was attacked 14 times in five days).

Our observations in Torres del Paine National Park during breeding follow. Whenever we saw harriers flying, they were facing the wind, which blew predominantly from the west. Their flight was slow, at about 35 to 40 m above ground. When a male carrying a prey item is near the nest he utters a cry that is answered by an incubating female.

Subsequently she flies while uttering calls, and the male then releases the prey which is seized in the air by the female. We observed 60 such prey transfers (Table 3), and only twice did a female fail to grasp the prey. Females always received prey from males, and then flew to the ground to eat it (partially or completely), or to the nest to feed nestlings. On 12 occasions we saw males descending to the ground and eating the prey, and on one occasion a male accidentally dropped its prey (Table 3). In agreement with previous observations, males and females ate prey on the ground or old nests, but never perched on shrubs. Although we saw many prey items being transported, only once did we see prey being captured: an immature Rufous-collared Sparrow (*Zonotrichia capensis*) dashed from the ground vegetation near an active harrier nest, and a male went after it and captured it within 30 m, in the air.

Diet

Brown & Amadon (1968) reported that the Cinereous Harrier is "said to catch small birds on the wing, which is unexpected in a harrier". Indeed, in Argentina it has been reported to hunt diligently for birds (Hudson 1984); in the Falklands it reportedly eats livestock carrion (Darwin, in Hudson 1984).

In Chile, the Cinereous Harrier has been reported to attack small birds, and to be an efficient hunter of tinamous (presumably chicks of *Nothoprocta perdicaria*); however, analysis of one stomach in southern Chile revealed 17 lizards and no other prey (Bullock 1929). Housse (1945) stated that the Cinereous Harrier eats only live prey, particularly rats and field mice, and he reported one observation of predation on a small hare (*Lepus capensis*). Examination of crops by Housse detected the following birds: *Gallinago gallinago* (Scolopacidae), *Columba araucana* (Columbidae), *Troglodytes aedon* (Troglodytidae), *Anthus correndera* (Motacillidae), *Sicalis* sp., *Sturnella loyca*, and *Diuca diuca* (all Emberizidae). Housse (1945) reported that the Cinereous Harrier also pursues snipes, tinamous, rails, coots, and particularly doves, but it most often searches for nests of ground nesting passerines and aquatic birds, and that it eats the eggs or hatchlings (including those of the Chimango Caracara, *Milvago chimango*). The Cinereous Harrier also eats insects and reptiles; out of 13 stomachs examined by Housse (1945) three contained only lizards.

According to Goodall *et al.* (1975) and Johnson (1965) the Cinereous Harrier lives on the rats, mice, small reptiles or birds, frogs, etc., that it catches as it flies back and forth. It eats at leisure on the ground hidden among the rushes, long grass, or wheat fields. In Tierra del Fuego the Cinereous Harrier does not appear to prey on birds (and they do not

TABLE 3

Individual prey transported by a male, a female, or transferred from a male to a female Cinereous Harrier in Torres del Paine National Park during the breeding season. The daily period was divided into three equal time intervals.

Prey categories are: L = Lizard; B = Bird; R = Rodent; U = Unidentified vertebrate prey.

Presas transportadas por un macho, una hembra, o transferidas de un macho a una hembra en el Parque Nacional Torres del Paine durante la estación de cría. El período diario fue dividido en tres intervalos de tiempo iguales. Las presas son: L = Lagartija; B = Pájaro; R = Roedor; U = Vertebrado no identificado.

Daily intervals:	0630 – 1130				1130 – 1630				1630 – 2130				TOTAL			
Prey Category:	L	B	R	U	L	B	R	U	L	B	R	U	L	B	R	U
Male	2	1	0	0	0	2	0	1	2	4	0	0	4	7	0	1
Female	0	0	0	0	5	2	0	2	2	2	1	0	7	4	1	2
Male to Female	10	7	3	1	8	11	0	2	4	11	0	3	22	29	3	6
Total	12	8	3	1	13	15	0	5	8	17	1	3	33	40	4	9
Time observed (min)	410				600				610				1,620			

seem scared in its presence), but to prey exclusively on lizards and rodents (Humphrey *et al.* 1970).

Our observations of prey in Torres del Paine National Park include prey transports and pellet contents (Tables 3 and 4, respectively). We identified three prey items that were dropped: two immature Rufous-collared Sparrows (*Zonotrichia capensis*) and one lizard (*Liolaemus d'orbignyi*), also noting that in all three cases the male carried dead prey. In nests we found another *Zonotrichia capensis,* one *Sturnella loyca,* and one fledgling of *Podiceps rolland.* Based on the five avian prey records, we noted that birds were transported after plucking their feathers, and with their legs fractured (one was headless). From the crops of 40 nestlings we obtained the following records: 27 nestlings had empty crops; 10 had avian flesh and feathers; 1 had a rodent; and 2 contained unidentified flesh (either avian or mammalian). The stomach contents of the two adult harriers captured were: one immature *Zonotrichia capensis* (the male), and the remains (skin and one eye) of a European hare *Lepus capensis,* probably taken as carrion by the female.

To the best of our knowledge, no quantitative information on the diet of the Cinereous Harrier is available from anywhere in South America. In Torres del Paine National Park we collected 388 unbroken pellets plus 25 broken pellets. Of these 413 pellets, 251 contained fibre (mainly reed stems, up to 8 cm long), 227 contained seeds (probably the crop contents of avian prey), 189 contained pebbles (probably taken while tearing apart and devouring prey on the ground), and 13 contained egg fragments (7 of *Circus cinereus,* 1 of the Lesser Rhea *Pterocnemia pennata,* 5 of unidentified birds). Length and width of the 388 unbroken pellets averaged (mean ± SD) 35.8 ± 8.4 mm and 16.8 ± 2.4 mm, respectively.

Based on the 1,259 prey items identified among the 413 regurgitated pellets, the diet of the Cinereous Harrier was the following (Table 4): 33.6 percent of the prey (by number) was made up by insects, 27.2% by birds, 19.1% each by mammals and reptiles, and 1.0% by arachnids. The low level of taxonomic resolution attained during examination of the pellets did not allow a clear association with prey biomass

TABLE 4

Diet of Cinereous Harriers in Torres del Paine National Park, during the breeding season. Numbers are of individual prey identified in 413 regurgitated pellets; subtotals are in brackets. a = adult bird; f = fledgling.

Dieta de los varis en el Parque Nacional Torres del Paine durante la estación de cría. Los números corresponden a individuos presa indentificados en 413 regurgitados; los subtotales aparecen entre corchetes. a = pájaro adulto; f = pichón.

MAMMALS	[240]
Lepus capensis (*)	1
Ovis aries (*)	1
Rodents unidentified	238
BIRDS	[343]
Podiceps sp.	1 f
Furnariidae unidentified	6 a + 6 f
Tyrannidae unidentified	1 f
Tachycineta leucopyga	1 a
Turdus falcklandii	1 f
Zonotrichia capensis	3 a
Curaeus curaeus	1 f
Phrygilus sp. (**)	6 a + 2 f
Fringillidae unidentified	15 a + 22 f
Birds unidentified	135 a + 143 f
REPTILES	[240]
Iguanidae unidentified	240
INSECTS	[423]
Carabidae	38
Tenebrionidae	67
Scarabaeidae	21
Curculionidae	13
Cerambycidae	2
Coleoptera larvae	19
Coleoptera pupae	1
Coleoptera adults	188
Lepidoptera larvae	16
Lepidoptera adults	1
Hymenoptera adults	54
Diptera pupae (*)	1
Orthoptera adults	2
ARACHNIDS	[13]
Aranea	10
Scorpionida	3
TOTAL PREY	1,259

(*) Presumably taken as or with carrion.
(**) Most likely *P. gayi,* but a few *P. patagonicus* may also be included.

consumed. The categories "Rodents unidentified", "Iguanidae unidentified", and "Birds unidentified" constituted 60% of the Cinereous Harrier's diet as reported. However, rodents in the area surrounding the marsh were likely to be either *Akodon xanthorhinus* (21.5 g) or *Oryzomys longicaudatus* (29.8 g; see Jaksić *et al.* 1986); lizards were most likely of the genus *Liolaemus* (*ca.* 5 g); and the birds identified to the species level weigh as adults (unpubl. data): *Turdus falcklandii* (94 g), *Zonotrichia capensis* (19 g), *Curaeus curaeus* (90 g), and *Phrygilus gayi* (20 g). Based on these data, the relative biomass contribution in the diet of the Cinereous Harrier is, in decreasing order, birds, mammals, lizards, insects, and arachnids.

A comparison between prey in pellets and that transferred from males to females (and presumably fed to nestlings) is warranted. Nestlings apparently were not supplied with insects; rodents represented about 5.0%, birds about 48.3%, and lizards about 36.7% of their presumed diet (see Table 3, numbers in the "male to female" row). The pellets included 19.1% rodents, 27.2% birds, and 19.1% lizards (Table 4). These data suggest that nestlings were fed rodents in a much smaller proportion than expected from the pellets contents, or conversely, that they were selectively fed birds and lizards.

CONCLUSIONS

Our results generally agree with previous anecdotal observations published in the regional literature. Although our field work was very short-spanned, in light of the little that was known on the biology of the Cinereous Harrier, we were able to contribute some substantial new information. We increased the known sample for bird weights from three to five, and reported for the first time the wing loading of this harrier. Our notes on reproductive behavior rendered the first quantitative assessment of prey transport and transfer by Cinereous Harriers. Also, our documentation of their pellets' contents appears to be the first of its kind in South America. Much more work is needed to understand the ecology of the Cinereous Harrier, and to make meaningful comparisons with the well known Marsh and Hen Harriers. The locality where we conducted our study may be an ideal place to do more thorough field work.

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