

# Biometrics and body masses of some birds of prey of Argentina

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Received on 22 July 2016. Accepted on 19 November 2016.

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**ABSTRACT:** We present data from 97 live specimens from 20 different taxa of diurnal raptors from Argentina. Data were obtained from bird banding campaigns conducted by the *Centro Nacional de Anillado de Aves (CENAA)*, Universidad Nacional de Tucumán, Argentina. Another important source of data was the *Centro de Rehabilitación de Aves Rapaces (CeRAR)*. We used mist nets and bal-chatri traps to catch birds during CENAA campaigns in central and northern Argentina, in order to band them and study their migration. During fieldwork, we measured total body length, bill length (exposed culmen and culmen with cere), wing chord, and body mass of each bird. The biometric information of raptors in Argentina is scarce. These measurements can therefore be useful for a variety of topics such as conservation, ecology, biology, taxonomy and phylogeny.

**KEY-WORDS:** Accipitridae, Cathartidae, diurnal raptors, Falconidae, measurements.

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In Argentina, 40 species of diurnal raptors, 20 species of nocturnal raptors and five scavengers are present, but very little is known about their biology and ecology due to their low population abundance and the difficulties associated with their study (Trejo *et al.* 2007). Previous studies reporting body masses of birds in the region include Belton (1984) and Dunning-Jr. (1992, 2008). However, in general, biometric data of raptors in Argentina is scarce (Trejo 2007). These measurements can be useful for a variety of topics such as conservation, ecology, biology, taxonomy and phylogenetic studies.

Few studies on austral raptors present morphometric data, and these are mostly based on specimens housed in collections, instead of live birds. Therefore, certain measurements such as body mass or total body length are nonexistent or inaccurate (Jiménez 1995). Here, we present information on body measurements and body mass of 20 species of scavengers and raptors belonging to the families Cathartidae, Accipitridae and Falconidae.

Data were obtained from bird banding campaigns conducted by the *Centro Nacional de Anillado de Aves de Argentina (CENAA)*, Universidad Nacional de Tucumán. Another important source of data was the *Centro de*

*Rehabilitación de Aves Rapaces (CeRAR)* of *Reserva Experimental de Horco Molle (REHM)*, which is part of the *Facultad de Ciencias Naturales e Instituto Miguel Lillo, Universidad Nacional de Tucumán*. The CeRAR, created in 2008 and under authorization from the *Departamento de Flora y Fauna* of Tucumán Province, rescues, rehabilitates, and releases raptors. These interventions are conducted according to international protocols and guidelines of the International Union for Conservation of Nature and Natural Resources (IUCN), taking into account both conservation and animal welfare. Many of these birds, especially of *Geranoaetus polyosoma*, were part of the undergraduate thesis work of Aráoz (2012).

We also used mist nets and bal-chatri traps (Bloom *et al.* 2007) to catch birds during CENAA campaigns in central and northern Argentina, in order to band them and study their migration. The bal-chatri traps, a handmade box of thick wire with numerous plastic wire ties on its exterior, upper surface, were baited with live laboratory mice. These plastic ties slide and entangle the legs of the raptors that attempt to take the mice, without causing injury to the birds. A heavy weight tied to the trap prevents birds from lifting the trap off the ground.

The two capture methods are different: mist nets catch prey at random, while bal-chatri traps deliberately aim to capture a particular individual. The later method presents some difficulties, for example, the capture success of the bal-chatri with *G. polyosoma* is usually very low, with only a few individuals captured in dozens of attempts.

The capture of birds of prey with nets was only occasionally possible, as several hawks, Barred Forest-falcons and American Kestrels (*Accipiter bicolor*, *A. striatus*, *Micrastur ruficollis*, and *Falco sparverius*, respectively) were entangled as they tried to feed on small birds caught in the nets; all of these captures occurred in dense forest. However, bal-chatri traps were specifically effective for Variable and Savanna Hawks (*G. polyosoma*, *B. meridionalis*, respectively) and Black-chested Buzzard-Eagles (*Geranoaetus melanoleucus*). We found that these traps operated better in open landscapes, such as at 3000 m high pastures composed of tall grasses.

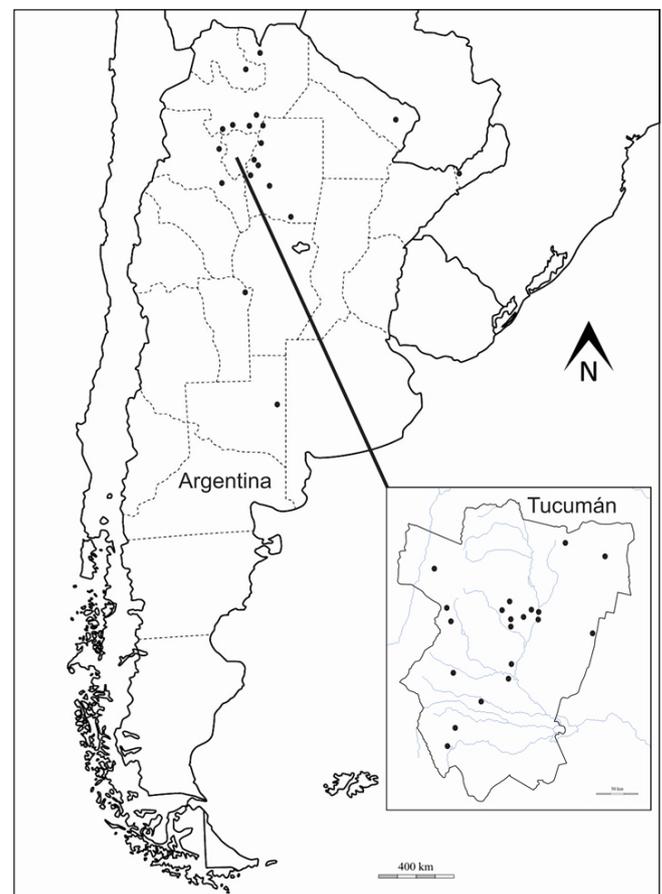
During fieldwork, we measured the total body length, bill length (exposed culmen and culmen with cere), and wing chord of every captured bird. We used a caliper to measure the bill, a metal ruler to measure wing chord and total body length, and 100 g, 500 g and 1000 g Pesola® scales to measure body mass. For heavier birds, a 50 kg digital scale was used. Birds were banded with bands from the *Instituto Miguel Lillo, Universidad de Tucumán*, and later released. Many birds were also banded with colored bands.

Age of *G. polyosoma* and *G. melanoleucus* was determined by plumage (Cabot & De Vries 2004, Seipke 2007). For the nomenclature of raptor species, we followed the list of species proposed by Remsen-Jr. *et al.* (2016).

We distinguish between captive birds and those captured in the field. Raptors raised from young might be smaller, and although measurements may be similar to those found in natural conditions if they have been in captivity for a longtime, their masses may be inaccurate (*i.e.*, they may be either very thin or very fat in comparison to natural conditions). Some specimens were sexed by plumage (*F. sparverius*, *G. polyosoma*, *Vultur gryphus*), while others that died at the CeRAR were sexed by gonad examination during necropsy. The sex of some birds with no sexual dimorphism in plumage remained undetermined; although females are usually larger, small females can frequently have measurements that overlap with smaller males.

The localities in Argentina (Figure 1) where specimens were obtained, by province, were: **Salta:** Orán (23°08'S; 64°19'W), Rosario de la Frontera (25°48'S; 64°58'W), Gaona (25°12'S; 64°05'W), Potrerillos (26.08°S; 65.46°W), Tolombón (26°12'S; 65°55'W); **Jujuy:** Caimancito, Calilegua (23°48'S; 64°47'W), Aguas Negras, Calilegua (23°55'S; 64°50'W); **Formosa:**

Comandante Fontana (25°20'S; 59°41'W); **Tucumán:** Ruta 9, Tapia (26°13'S; 65°16'W), Burruyacu (26°29'S; 64°44'W), Altos de Medina (26°36'S; 65°05'W), Amaicha del Valle (26°36'S; 65°55'W), Tafi Viejo (26°43'S; 55°33'W), San Javier (26°43'S; 65°22'W), Pinar de Velárdez (26°43'S; 65°22'W), Horco Molle (26°45'S; 65°23'W), El Infiernillo (26°45'S; 65°40'W), Villa Mariano Moreno (26°46'S; 65°12'W), Cebil Redondo (26°47'S; 65°17'W), Alderetes (26°49'S; 65°08'W), Yerba Buena (26°49'S; 65°19'W), Country Las Yungas (26°49'S; 65°19'W), Villa Amalia (26°51'S; 65°12'W), San Pablo (26°52'S; 65°18'W), Los Vallistos (26°59'S; 65°15'W), Tafi del Valle (26°52'S; 65°41'W), Lastenia (26°52'S; 65°09'W), Las Cejas (26°53'S; 64°44'W), La Aguadita (26°69'S; 65°12'W), Famaillá (27°03'S; 65°24'W), Río Colorado (27°09'S; 65°21'W), Simoca (27°16'S; 65°20'W), Concepción (27°20'S; 65°35'W), Reserva Provincial de Santa Ana (27°26'S; 65°46'W), Escaba (27°39'S; 65°45'W); **Misiones:** Posadas (26°55'S; 54°31'W); **Catamarca:** Santa María (26°41'S; 66°02'W), Capital (28°28'S; 65°46'W); **Santiago del Estero:** Rapelli (26°23'S; 64°30'W), Guasayán (27°06'S; 64°16'W), Pozo Hondo (27°10'S; 64°29'W), Capital (27°47'S; 64°16'W), Loreto (28°18'S; 64°12'W), Sumampa (29°22'S; 63°28'W); **San Luis:** Bajo de Veliz (32°18'S; 65°24'W); **La Pampa:** Guatraché (37°40'S; 63°32'W).



**FIGURE 1.** Sampling sites in Argentina where specimens were captured (black dots). Tucumán Province is displayed at the bottom right.

At El Infiernillo, Taquí del Valle, Tucumán Province, we captured 17 specimens during the impressive migration of birds of prey that takes place in fall, and which belongs to an Andean migratory route (Capllonch *et al.* 2011). The area is a true migratory corridor that acts as a “funnel” for soaring birds (Trejo *et al.* 2007, Capllonch & Ortiz 2009). This region constitutes the first site with a migration of such magnitude, in terms of number of birds, described for migrating raptors in Argentina (Capllonch *et al.* 2011), especially for *G. polyosoma* (Aráoz 2012). The valley, which reaches 2000 m a.s.l. and has an extension of 20 km between 27°S and 65°W, acts as a connection between two mountain chains, Aconquija and Cumbres Calchaquíes, and thus, specimens are able to acquire greater speeds when crossing the valley in a N-S direction.

We obtained data from 97 live specimens from 20 different taxa. The most captured species were *G. polyosoma*, *G. melanoleucus*, *Buteo magnirostris*, and *F. sparverius*. Three subspecies of Roadside Hawk (*B.*

*magnirostris*) were captured: *saturatus* from the Yungas, *pucherani* from the eastern Chaco, and *magniplumis* from the Atlantic Rainforest (Table 1). Regarding *G. p. poecilochrous*, which is common and resident in Taquí del Valle, it was earlier considered a distinct species, with some authors still considering it as a full species, but later genetic studies placed it subspecifically (Riesing *et al.* 2003). This subspecies coexists during winter months with *G. p. polyosoma* in valleys between 2000 and 3500 m a.s.l.

For *F. sparverius*, all of which belong to the same subspecies in Argentina, individuals captured in the southern area of Argentina are larger than those in the north, confirming Bergmann's Rule. Specimens captured in La Pampa Province (Guatraché) and in Bajo de Véliz, at 32°S, in San Luis Province (the two most southerly points in Figure 1), are strikingly larger than those captured in Tucumán Province, at 26°S. The same applies to some specimens caught at 2000 m a.s.l. in Taquí del Valle, Tucumán Province, which are larger than those captured on the plains.

**TABLE 1.** Body mass, total body length, wing chord, tail, bill, and tarsus length measurements of 97 live specimens. CERAR = data provided by Centro de Rehabilitación de Aves Rapaces; CENAA = data obtained from bird banding campaigns conducted by the National Bird Banding Center; M = male; F = female; A = adult; SA = subadult; - data not obtained.

Species Place	Location	n	Sex and age	Body mass (g)	Total body length (cm)	Wing chord (cm)	Tail (cm)	Culmen with cere (cm)	Culmen without cere (cm)	Tarsus length (cm)
Cathartidae										
<i>Vultur gryphus</i> CeRAR	Taquí del Valle	1	AF	10000	107	77.4	40	7.1	4.6	14.5
<i>Sarcorhamphus papa</i> CeRAR	Catamarca	1	A	3100	75	51	22	-	-	-
<i>Cathartes aura</i> CeRAR	Taquí Viejo	1	A	1460	66.5	54.6	-	5	-	7.6
Accipitridae										
<i>Geranoaetus melanoleucus</i> CeRAR	Santa María, Guasayán, Las Cejas, Yerba Buena, Rapelli, Alto de Medina, Concepción, Santiago del Estero, Burruyacú	7/9/10	A	2125.5 (n = 10)	68.75 (n = 9)	52.25 (n = 9)	29 (n = 10)	5.12 (n = 10)	3.68 (n = 7)	11.85 (n = 10)
<i>Spizastur melanoleucus</i> CeRAR	Orán	1	SA	1030	60	38	28	5.5	4	8
<i>Rupornis magnirostris pucherani</i> CENAA	Comandante Fontana	1	AF	340	37	25.6	17	3.7	1.9	8
<i>Rupornis magnirostris magniplumis</i> CeRAR	Posadas	1	A	365	31	-	-	2.5	1.9	7
<i>Rupornis magnirostris saturatus</i> CENAA CeRAR	Agua Negra, Reserva Santa Ana, Reserva La Florida, San Javier, Tucumán, San Pablo, Yerba Buena, Banda del Río Salí, Famaillá	10/12/ 14/15	A	311.92 (n = 14) (215–410)	39.33 (n = 14) (37–44)	26.60 (n = 15) (24–28)	18.55 (n = 14) (16–21)	2.85 (n = 12) (2.5–3.5)	1.83 (n = 10) (1.7–2.3)	7.5 (n = 14) (7–8.4)
<i>Geranoaetus polyosoma</i> CENAA	Calilegua, Caimancito, Valle de La Sala, Taquí del Valle Tucumán, Amaicha del Valle	3	M	738.33 (720–770)	46.3 (43–47)	36.8 (41–32)	22.1 (21–23)	3.3 (3.1–3.5)	2.4 (2.2–2.6)	9.23 (8.7–9.8)

Species Place	Location	n	Sex and age	Body mass (g)	Total body length (cm)	Wing chord (cm)	Tail (cm)	Culmen with cere (cm)	Culmen without cere (cm)	Tarsus length (cm)
<i>Geranoaetus polyosoma</i> CeRAR, CENAA	Tolombón, El Infiernillo, Tafi del Valle	7	SA	797.85 (660–900)	48.6 (46.5–50)	38.5 (34–42.5)	22.1 (21.5–23)	3.3 (3.1–3.5)	2.3 (2.2–2.5)	10.1 (9–10)
<i>Geranoaetus polyosoma poecilochrous</i> CENAA	El Infiernillo	2	SA	-	49.25 (49–49.5)	44.25 (43.5–45)	22.65 (22.5–22.8)	3.5	2.5	10.5 (10–11)
<i>Buteogallus urubitinga</i> CeRAR	Simoca	1	SA M	-	64	42	27	4.5	3.2	13
<i>Buteogallus meridionalis</i> CENAA, CeRAR	Comandante Fontana, Guachula, Loreto	2/3	A	840 (n = 3) (740–895)	49.8 (n = 3) (48–53)	40.6 (n = 3) (38–43)	21.6 (n = 3) (21–23)	3.7 (n = 3) (3.3–4)	2.8 (n = 2) (2.6–3)	12.25 (n = 2) (12–12.5)
<i>Parabuteo unicinctus</i> CeRAR	Agua Amarga	1	A	880	53	33	24	3.5	2.5	10
<i>Accipiter striatus</i> CENAA	Potrerrillos	1	A	100	26	16.4	13.7	-	1	4.6
<i>Accipiter bicolor</i> CENAA	Rosario de la Frontera	1	A	149	31.5	25.5	16.8	-	-	5.1
CeRAR	Tafi Viejo	1	A		42	32	21	2.5	2.0	7
Falconidae										
<i>Falco sparverius</i> CENAA, CeRAR	Pozo Hondo, Tucumán, Guatrache, Tafi del Valle.	5/8/9	AM	105.5 (n = 9) (80–120)	25.3 (n = 8) (22.5–27.2)	18.1 (n = 8) (16–19)	12.6 (n = 8) (11–13.4)	1.5 (n = 8) (1.5–1.6)	1.1 (n = 5) (1.1–1.2)	4.2 (n = 8) (4/4.6)
<i>Falco sparverius</i> CENAA, CeRAR	Gaona, Bajo de Veliz, Alderetes, Cebil Redondo, Tucumán, Tafi del Valle, Tafi Viejo	11/12	AF	116.8 (n = 11) (90–152)	26 (n = 12) (23–28)	19 (n = 11) (17–21)	13.2 (n = 12) (10.9–15)	1.5/1.2 (n = 12) (1.5–1.8)	1.2 (n = 11) (1.2–1.4)	4 (n = 12) (3.8–4.5)
<i>Falco femoralis</i> CeRAR	Villa Mariano Moreno	1	A	230	32	24	10	2.2	1.6	6
<i>Caracara plancus</i> CeRAR	La Aguadita, Tucumán, Banda del Río Salí, Escaba, Lastenia.	3/4/5/6	A	811.25 (n = 4) (700–960)	53.1 (n = 5) (50–57)	37.1 (n = 6) (32–40.1)	23 (n = 6) (20.5–25)	4/3 (n = 6) (3.5–4.3)	3 (n = 3) (3–3.1)	9.84 (n = 5) (9.1–10.2)
<i>Caracara plancus</i> CeRAR	Tucumán, Capital	1	SA	835	52	36	22.4	5	2.7	7.5
<i>Milvago chimango</i> CeRAR	Villa Amalia, Yerba Buena, Río Colorado, Los Vallistos, La Aguadita, Ruta 9, Tucumán	6/7/8/9	A	226.87 (n = 8) (170–260)	35.3 (n = 8) (32–39.4)	27.7 (n = 7) (25–29.9)	18.5 (n = 8) (10–19.5)	2.6/1.8 (n = 9) (2.5–3.1)	1.8 (n = 6) (1.7–2.1)	5.6 (n = 9) (4.8–6.7)
<i>Spizapteryx circumcincta</i> CENAA	Sumampa, Bajo de Velis	2	A	157.5 (155–160)	28.7 (28.3–29.2)	17.2 (17–17.4)	15 (14.8–15.5)	1.9	1.6	4.8 (4.5–5.1)
<i>Micrastur ruficollis</i> CENAA	Reserva Santa Ana, Pinar Velárdez, Santa Lucía.	2/3	A	190 (n = 3) (180–207)	37 (n = 2) (35–39)	18 (n = 2) (18.5–19)	18.5 (n = 2) (18–19)	1.8/1.5 (n = 2) (1.7–1.9)	1.5 (n = 2) (1.4–1.6)	6.1 (n = 2)

## ACKNOWLEDGEMENTS

This research was supported by the *Centro Nacional de Anillado de Aves*. We are grateful to the CENAA banders for their help with fieldwork. This study was made possible by funds provided by CONICET and the *Universidad Nacional de Tucumán*, Argentina. Finally, we thank the *Facultad de Ciencias Naturales e Instituto Miguel Lillo*, *Universidad Nacional de Tucumán* for providing vehicles and drivers.

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Associate Editor: Luis F. Silveira.