WHITE-EARED OPOSSUM
Didelphis albiventris (Lund, 1840)

FIGURE 1 - (FPMAM6PH) Adult, Estancia Nueva Gambach, PN San Rafael (Paul Smith March 2007).

TAXONOMY: Class Mammalia; Subclass Theria; Infraclass Metatheria; Magnorder Ameridelphia; Order Didelphimorphia; Family Didelphidae; Subfamily Didelphinae; Tribe Didelphini (Myers et al 2006, Gardner 2007). The genus *Didelphis* was defined by Linnaeus, 1758. There are five known species according to the latest revision (Gardner 2007) two of which are present in Paraguay. The generic name *Didelphis* is from the Greek meaning "double womb" in reference to the pouch as a second womb, and *albiventris* is derived from the Latin for "white-bellied" (Braun & Mares 1995). The species is monotypic (Gardner 2007).

This species was Azara´s "Micouré premier, ou micouré proprement dit" (Voss et al 2009). Only recently is the name *D.albiventris* gaining widespread acceptance for this species, with the names *D.azarae* Temminck (1824) and *D.paraguayensis* JA Allen (1902) being frequently used in the literature. The former name was rejected by Hershkovitz (1969) who pointed out that Temminck´s description is based on several "black-eared opossums" and not this species. The latter name comes from Oken (1816) and given

that his names were deemed non-Linnean by the ICZN it is unavailable for usage. The next oldest available name for the species is *D.albiventris* Lund (1840). Synonyms adapted from Gardner (2007):
[*Didelphis*] *albiventris* Lund 1839:233. Nomen nudum.
Didelphis albiventris Lund 1840:18. Type locality "Rio das Velhas", Lagoa Santa, Minais Gerais, Brazil.
Didelphis poecilotus JA Wagner 1842:358. Type locality "Angaba" (=Cuiabá), Matto Grosso, Brazil.
D[*idelphys*]. *poecilonota* Schinz 1844:504. Type locality "Angaha in Brazilien" (=Cuiabá), Matto Grosso, Brazil.
Didelphis azarae Tschudi 1845:143. In part, not *D.azarae* Temminck 1824.
Didelphis poecilotis JA Wagner 1847:126. Spelling emendation
Didelphis leucotis JA Wagner 1847:127. Based on "Le Micouré Premier" of de Azara (1801) with type locality "Paraguay".
Gamba aurita var. *brasiliensis* Liais 1872:329. In part. Implied type locality Brazil.
Didelphis marsupialis var. *azarae* O.Thomas 1888:129. Name combination. Not *Didelphys azarae* Temminck (1824).
Didelphis marsupialis azarae Cope 1889:129. Name combination. Not *Didelphys azarae* Temminck (1824).
Didelphys Azarae m[utación]. *antiqua* Ameghino1889:278. Type locality "Barrancas del Río Primero", Córdoba, Argentina.
Didelphys lecehi Ihering 1892:98. Type locality "Sul do Río Grande" Rio Grande do Sul, Brazil.
Didelphis marsupialis var. *albiventris* Winge 1893:7. Name combination.
[*Didelphys* (*Didelphys*) *marsupialis*] *Azarae* Trouessart 1898:1235. Name combination.
Did.[*elphis*] *paraguayensis* JA Allen 1902:251. Based on *Didelphis paraguayensis* of Oken (1916) in turn based on de Azara (1801) with type locality "Asunción, Paraguay"
[*Didelphys* (*Didelphys*)] *paraguayensis* Trouessart 1905:853. Name combination.
[*Didelphis* (*Didelphis*)] *poecilotis* Matschie 1916:268. Name combination.
[*Didelphis* (*Didelphis*)] *albiventris* Matschie 1916:268. Name combination.
[*Didelphis* (*Didelphis*)] *lechei* Matschie 1916:268. Name combination.
D.[*idelphis*] *opossum* Larrañaga 1923:346. Name combination. Not *Didelphis opossum* Linnaeus, 1758.
Didelphis paraguayensis bonariensis Marelli 1930:2. No type locality, but subsequently restricted to Provincias Buenos Aires and Santa Fé, Argentina by Marelli (1932).
Didelphis paraguayensis dennleri Marelli 1930:2. No type locality, but subsequently restricted to Provincia Buenos Aires, Argentina by Marelli (1932).
Didelphys azarai Ringuelet 1954:295. Incorrect spelling of, but not *Didelphys azarae* Temminck. 1824.
Didelphis lechii Vieira 1955:345. Incorrect spelling.
Didelphis azarae azarae Cabrera 1958:41. Name combination, not *Didelphys azarae* Temminck. 1824.
Didelphis albiventris Hershkovitz 1969:54. First modern use of current name.
ENGLISH COMMON NAMES: White-eared Opossum (Wilson & Cole 2000, Gardner 2007), Azara´s Opossum (Eisenberg 1989), White-belly Opossum (Noguiera 1988), Cassaco (Gardner 2007), Common Opossum (Oliveira et al 2010), South-American Opossum (Cesario & Matheus 2008), White-bellied Opossum (Quintão e Silva & Araújo Costa 1999).
SPANISH COMMON NAMES: Comadreja común (Esquivel 2001, Massoia et al 2000), Zarigüeya común de orejas blancas (Emmons 1999, Esquivel 2001), Comadreja overa (Massoia et al 2000, Parera 2002, Eisenberg 1989), Comadreja mora (Massoia et al 2000, Emmons 1999), Picaza (Massoia et al 2000), Carachupa oreja blanca (Cuéllar & Noss 2003), Comadreja negra (Marelli 1930), Comadreja picaza, Comadreja orejas blancas, Mbicuré común (Massoia et al 2006), Zorrillo (Martins et al 2010).
GUARANÍ COMMON NAMES: Ngure (Esquivel 2001), Mykure **PMA** (SEAM et al 2001, Villalba & Yanosky 2000), Guné **Ac** (Villalba & Yanosky 2000), Mbicuré (Parera 2002), Mbikuré eté (Massoia et al 2000), Karachupa (Cuéllar & Noss 2003).
DESCRIPTION: A robust marsupial, the largest in Paraguay. Pelage dense and usually grey (88% of individuals) darker along the medial line, and often appearing somewhat unkempt due to the presence of different length hairs. A rare dark phase makes up about 12% of individuals. Long, white-tipped guard hairs. Basally the pelage is often paler and greyer, though there is great variation amongst individuals and some are distinctly dark. Ventrally somewhat paler. Triangular head with pronounced, pointed snout and fairly large, rounded white ears. Head mostly white with a black medial stripe and black patches around the

eyes. The nose is pink and the eyes are brown. The prehensile tail is furred basally and naked for the rest of its length, save for a few scarce hairs. Naked area of the tail is black on the basal half and white on the distal half. Females possess a marsupium (pouch) in which the teats are contained, arranged in a circle with one in the middle. The number of teats is variable but commonly there are 13 (Eisenberg 1989). Sexual organs of both species are linked to the anal duct in their latter half and both exit via an external cloaca. Males are larger than females with more prominent canines. Young animals are similar but have less obviously white ears. Albinism has been reported but is rare.

CRANIAL CHARACTERISTICS: Robust cranium with long, broad snout. Well-developed sagittal and lamboidal crest in adults. Interorbital ridge thin with a long postorbital constriction behind the postorbital process. Broad zygomatic arch only slightly expanded. Brain case small. (Díaz & Barquez 2002). Abdala et al (2001) described the postweaning ontogeny of the skull of this species and defined the following characteristics as useful for distinguishing between juvenile (<8 months old) and adult (>9.5 months old) skulls: Supraorbital border of frontal, postorbital constriction, secondary foramen ovale and groove for petrosal sinus are all present in the adult and absent in juvenile; Gyrus of anterior semicircular canal is narrow in juvenile and wide in adult; Cavum supracochlear floor is incomplete in juvenile and complete in adult; Petrosal, promontorium and tympanic process of the petrosal relatively large in juvenile and relativel small in adult; Fossa subarquata and internal acoustic meatus relatively large in juvenile and relativel small in adult; Dorsal margin of foramen magnum formed by interparietal in juveniles and exoccipitals in adults; Exoccipital and basioccipital partially fused in juveniles and completely fused in adults; Petrosal fixed to squamosal in juveniles, loosely attached in adults; Sphenorbital fissure and foramen rotundum almost adjacent in juvenile but separated by wall of alisphenoid in adults; Sphenorbital fissure and foramen ethmoidal almost adjacent in juvenile but separated by wall of orbitosphenoid in adults.

Mares & Braun (2000) gave the following combined sex measurements for 6 adult specimens (2 male, 3 female, 1 unsexed) from Argentina: *Greatest Length of Skull* 86mm (75.3-94mm); *Condylobasal Length* 84.8mm (75.3-94mm); *Interorbital Width* 10.6mm (9.8-11.2mm); *Zygomatic Width* 45.1mm (39.2-53.6mm); *Width of Braincase* 25.2mm (23.1-27.4mm); *Mandibular Length* 68.9mm (60-76.6mm); *Palate Length* 50.2mm (45.7-55.1mm); *Occipitonasal Length* 84mm..

Mares et al (1989) give the following measurements for adults (2 males and 2 females) and subadults (n=9; 3 males and 6 females) from central Brazil: *Greatest Length of Skull* ad. males 98.3mm, ad females 91mm (86.4-95.5mm), subad. 63mm (43-76mm); *Condylobasal Length* ad. males 88.3mm, ad females 83.7mm (80.4-87mm), subad. 56.5mm (38.2-69.4mm); *Interorbital Width* ad. males 9.5mm, ad females 9.8mm (9.7-9.8mm), subad. 9.4mm (8.8-9.8mm); *Zygomatic Width* ad. males 54mm, ad females 47.4mm (45.5-49.3mm), subad. 33.6mm (22.9-41mm); *Width of Braincase* ad. males 27.3mm, ad females 26.9mm (26.1-27.6mm), subad. 19.3mm (16.1-21.5mm); *Mastoid Width* ad. males 31.1mm, ad females 26.3mm (23.7-28.8mm), subad. 20.5mm (14.9-24mm); *Palate Length* ad. males 52.3mm, ad females 51.6mm (49-54.1mm), subad. 35.5mm (25.3-43.7mm).

DENTAL CHARACTERISTICS: I5/4 C1/1 P 3/3 M 4/4 = 50. P1 small, P2 and P3 similar in size (Díaz & Barquez 2002). P3 not peg-like and narrow with a pronounced posterior-labial groove. (Lemos & Cerqueira 2002). Tyndale-Biscoe & MacKenzie (1976) summarised ageing in *Didelphis* opossums based on dental wear by defining 7 age classes as follows: *Dental Class 1*: (<4 months) dP3 M1 no cusp wear; *Dental Class 2*: (4-6 months) dP3 M2 no cusp wear; *Dental Class 3*: (5-7 months) dP3 M3 no cusp wear; *Dental Class 4*: (6-11 months) P3 M3 no cusp wear; *Dental Class 5*: (9-16 months) P3 M4 no cusp wear; *Dental Class 6*: (15-23 months) P3 M4, cusp wear on P3 and M1-2; *Dental Class 7*: (>22 months) P3 M4, cusp wear on P3 and M3-4.

Astúa de Morães et al. (2001) describe supernumerary molars in two specimens of this species. Specimen DZUFMG 120 showed a small ovaloid molar, 33% the size of M4 erupted behind the right M4. Specimen MN 2250 has an extra molar behind every series. The upper left molar is smaller than the corresponding M4 and slightly rotated anti-clockwise. That on the upper right side is identical to the M4 but about half the size. The crowns of both upper extra molars lie below the occlusal series. The molars on the lower series are similar but not identical to the respective M4s.

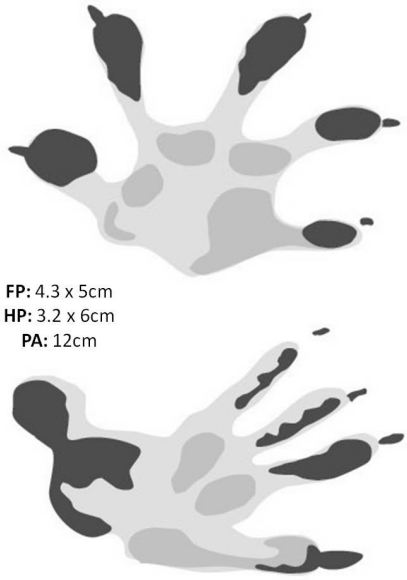
González (2000) describes a supernumerary molar from a Uruguayan specimen (MNHN 2544, Dpto. Tacuarembó) in the upper right dentary series, equivalent to an M5 and which resembled the M4

but was slightly smaller. The author considers this support for the theory that molar dentition in Didelphimorphia is a serial repetition of a basic pattern.

Mares & Braun (2000) gave the following combined sex measurements for 6 adult specimens (2 male, 3 female, 1 unsexed) from Argentina: *Length of Upper Toothrow* 32.9mm (29.7-36.1mm); *Length of Lower Toothrow* 36.4mm (32.2-40.8mm). Mares et al (1989) give the following measurements for adults (2 males and 2 females) and subadults (n=9; 3 males and 6 females) from central Brazil: *Length of Upper Toothrow* ad. males 33.9mm, ad females 33.6mm (32.4-34.8mm), subad. 23.8mm (15.8-32.1mm).

GENETIC CHARACTERISTICS: 2n=22 (Svartman & Vianna-Morgante 1999). Karyotype with 10 uni-armed autosomes with terminal centromeres, an acrocentric X and a minute Y. Lemos et al (1999) report the occurrence of mtDNA like sequences in the nuclear genome of this genus.

TRACKS AND SIGNS: *Didelphis* prints are characteristically wider than they are long with a notably uneven appearance, especially on the hindfoot which shows fore toes displaced to one side and the opposable thumb on the other side. The tail being dragged behind the body often leaves an impression. **FP:** 4.3 x 5cm; **HP:** 3.2 x 6cm; **PA:** 12cm. (Villalba & Yanosky 2000, Massoia et al 2009).



EXTERNAL MEASUREMENTS: A large and robust Didelphid with tail approximately the same length as the head and body. **TL:** 76.3cm (59-89.2cm); **HB:** 30-44.2cm; **TA:** 37.3cm (29-45cm); **FT:** 5.96cm (4.2-6.8cm); **EA:** 5.4cm (4.1-6.5cm); **WT:** 1560g (500-2500g); **WN:** 0.15g (Massoia et al 2001, Parera 2002, Emmons 1999, SEAM et al 2001, Redford & Eisenberg 1992).

Mares & Braun (2000) gave the following combined sex measurements for 27 adult specimens (14 male, 12 female, 1 unsexed) from Argentina: **TL:** 67.4cm (38-80.7cm); **HB:** 34.46cm (26-42.5cm); **TA:** 32.94cm (12-39.5cm); **FT:** 5.29cm (4.8-6.1cm); **EA:** 5.42cm (5-6cm); **WT:** 1173.8g (508-2000g). Mares et al (1989) give the following measurements for adults (2 males and 2 females) and subadults (n=9; 3 males and 6 females) from central Brazil: **TL:** ad. males 70.35cm (70-70.7cm), ad females 68.05cm (65.6-70.5cm), subad. 47.03cm (30-59cm); **TA:** ad. males 31.6cm (31.4-31.8cm), ad females 32.2cm (30.5-33.9cm), subad. 23.38cm (15.2-30.9cm); **FT:** ad. males 5.05cm (5-5.1cm), ad females 4.65cm (4.5-4.8cm), subad. 3.69cm (2.3-4.6cm); **EA:** ad. males 5.6cm (5.5-5.7cm), ad females 5.6cm (5.2-6cm), subad. 4.5cm (3.7 -5.3cm); **WT:** ad. males 1000g+, ad females 955-1000g+, subad. 337.5g (70.5-590g).

Cáceres & Monteiro-Filho (1999) noticed a correlation between head length and age class, and stated that the measurement may be used to estimate body length. Mass was noted to increase during autumn in preparation for the winter season with fewer resources, and older adults showed tendencies towards obesity. Adult size is reached about 10 months. They gave the following external body measurements for differing age classes of males and females from southern Brazil:

Infant (4-6 months old, dental class 2): **Head:** male 7.4cm (+/-0.6) female 7.1cm (+/-0.6); **WT:** male 222g (+/-84) female 200g (+/-88).

Young (5-7 months old, dental class 3): **Head:** male 9.8cm (+/-0.7) female 9.7cm (+/-0.5); **Body:** male 23.5cm (+/-1.7) female 25.2cm (+/-1.9); **FT:** male 4.7cm (+/-0.3) female 4.8cm (+/-0.6); **WT:** male 623g (+/-210) female 809g (+/-154).

Subadult (6-11 months old, dental class 4): **Head:** male 11.2cm female 11.2cm (+/-1.1); **Body:** male 30.9cm female 28.9cm (+/-0.4); **FT:** male 5.1cm female 5.6cm (+/-0.3); **WT:** male 1180g female 1042g (+/-194).

Young adult (9-16 months old, dental class 5): **Head:** male 13.3cm (+/-0.7) female 12cm (+/-0.2); **Body:** male 35.2cm (+/-0.6) female 33.9cm (+/-1.9); **FT:** male 5.8cm (+/-0.3) female 5.6cm (+/-0.4); **WT:** male 1673g (+/-54) female 1377g (+/-202).

Adult (15-23 months old, dental class 6): **Head:** female 13.8cm (+/-0.7); **Body:** female 38cm (+/-2.6); **FT:** female 6.1cm (+/-0.4); **WT:** female 1786g (+/-182).

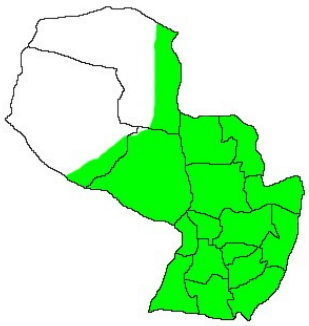
Senile adult (>22 months old, dental class 7): **Head:** female 14.1cm (+/-1); **Body:** female 38.1cm (+/-0.2); **FT:** female 6.1cm (+/-0.1); **WT:** female 2020g (+/-78).

Carusi et al (2009) note sexual dimorphism in total length, with males 3-6.5% longer in their measurements than females. They suggested that this difference could be related to female investment in gestation and lactation, or differences in home range sizes and space use.

SIMILAR SPECIES: This is generally the most commonly encountered and widespread Paraguayan marsupial. It is most likely to be confused with the *Didelphis aurita*, which is smaller, typically darker and more strictly associated with humid forest habitat - ie. they are much less tolerant of human presence. *D.aurita* has a rich golden-buff base colouration to its pelage which is particularly obvious on the head, that of this species being whitish. As suggested by the common name this species can also be distinguished by its white as opposed to black ears. The fur at the base of the tail extends further down the tail in this species than in the Black-eared Opossums. Note that juveniles often have extensive black on the ears basally that may lead to confusion, but always have a whitish colour basally to the pelage. (Redford & Eisenberg 1992).

DISTRIBUTION: Widely distributed east of the Andes from Colombia and western Venezuela south to Provincia Rio Negro (41ºS) in Argentina, north to the Atlantic coast of Brazil, though absent from the Amazon Basin where it is replaced by other species. In Argentina the species occurs west as far as Barreal (31°36' S, 69°27' W) in Provincia San Juan at an altitude of 1900m (Teta & de Tomasso 2009). In Bolivia the species is known from Departamentos Santa Cruz, Chuquisiaca, Tarija, Potosí, Cochabamba, Oruro and La Paz (Anderson 1997). The species occurs throughout Uruguay, with Sanborn (1929) mentioning specimens from Departamentos Maldonado, Treinta y Tres, Colonia and Soriano.

In Paraguay the species is widely distributed throughout eastern Paraguay where it even occurs in the suburbs of Asunción, and also through the Humid Chaco and Pantanal region, being absent only from the Dry Chaco ecotone. (Parera 2002, SEAM et al 2001).



HABITAT: An adaptable habitat generalist able to tolerate a large degree of habitat disturbance and actively seeking human habitation and exploiting them for food resources in rural areas. White-eared Opossums occur in humid forest and edge (P.Smith pers.obs.) being most common where degraded or affected by human activity, but are equally at home in cerrado and relatively open grassland areas provided that sufficient food, some tree cover and sleeping places are available.

In the cerrado of Brazil they were captured in all major cerrado types, gallery forest and wet areas (Mares et al 1989). Streilein (1982a) notes that they are ubiquitous in the caatinga of Brazil but use microhabitats differentially in response to rainfall patterns, preferentially seeking out rocky areas during the driest months Streilein (1982d). They tend to prefer areas in close proximity to water and trees and are apparently absent from the driest areas of the Chaco (Parera 2002, SEAM 2001), though they are present and common in the Chaco and Chiquitania of Bolivia (Cuéllar & Noss 2003). Talamoni & Dias (1999) captured 65 of 104 individuals in semideciduous forest and 33 in gallery forest in northeastern São Paulo State, but only 6 individuals were captured in nearby campos cerrado.

ALIMENTATION: Omnivorous and opportunistic, able to exploit a wide range of food sources from plant matter including fruit, leaves and seeds, to animal matter such as invertebrates, small mammals and birds. When a particular foodstuff is abundant it is typically exploited repeatedly until it is exhausted.

Foraging Behaviour and Diet Talamoni & Dias (1999) described the diet of this species as "generalist" in São Paulo after analysing the contents of 31 scats and five stomachs. They found the following percentage occurrence: invertebrates stomach 33.4% scat 51.7%; vegetable material stomach 27.8% scat 5.2%; birds stomach 16.7% scat 12.1%; fruits/seeds stomach 11.1% scat 24.2%; unidentified vertebrates stomach 5.5% scat 3.4%; grasses stomach 5.5% scat 0%; rodents stomach 0% scat 3.4%;

Cáceres (2002) investigated diet and the species role as a seed disperser through a fecal analysis in Curitiba, Brazil. He found the species to be strongly omnivorous and that diet did not vary with age. Invertebrates occurred in 100% of scats, fruits in 76%, vertebrates in 58% and refuse 8%. Fruit

consumption and the consumption of some animal prey (eg reptiles and coleoptera) increased during the wet season, whilst other fruits and different animal prey (eg birds and diplopods) were more prominent during the drier part of the year. Animal prey consisted largely of species occurring in leaf litter, suggesting predominately terrestrial foraging. The following items were recorded in scats, with percentages representing the percentage of scats which contained the given item: Vertebrates (58%) - Birds 28%, Reptiles 19% (wet season only and mainly *Liotyphlops beui*), Mammals 15% and Fish 1%. Invertebrates (100%) - Coleoptera 76%, Opiliones 60%, Blattaria 44%, Diplopoda 41%, Pulmonata 41%, Hymenoptera (mainly ants) 31%, Isopoda 13%, Lepidoptera (larvae) 10%, Decapoda 8%, Orthoptera 4% and Hemiptera 1%.

Fruits taken were mainly coloniser species emphasising the role of the species as important dispersers and included the following families - Solanaceae (*Solanum sanctaecatharinae* 18%, *S. cf maioranthum* 9%, *Vassobia breviflora* 7%, *Solanum* sp 4%, *Cyphomandra corymbiflora* 1%), Passifloraceae (*Passiflora actinia* 18%, *Passiflora* sp 1%), Moraceae (*Morus nigra* 11%), Rosaceae (*Rubus erythrocladus* 11%, *Rubus rosifolius* 4%), Piperaceae (*Piper gaudichaudianum* 6%), Cucubitaceae (*Melothria cucumis* 7%, *Cucumis* sp 6%), Arecaceae (*Syagrus romanzoffiana* 3%), Poaceae 3%, Myrtaceae (*Psidium guajava* 1%), Rutaceae (*Citrus* sp. 1%), Melastomataceae (*Leandra australis* 1%) and Erythroxylaceae (*Erythroxylum deciduum* 1%). All seeds that passed through the digestive system of the animal undamaged were less than 0.8cm long in adults and less than 0.4cm long in juveniles. Larger seeds were either destroyed, or in the case of very large seeds (eg *Syagrus romanzoffiana*) discarded without being consumed.

Cáceres & Monteiro-Filho (2007) examined germination rates of seeds consumed by *Didelphis* opposums in southern Brazil, finding that germination rates of seeds that had passed through opossum guts were similar to those of control groups for thirteen species of pioneer plants, with the exception of *Rubus rosifolius* which required gut passage for germination.

Alessio et al (2005) documented feeding on tree gum by this species in the northeastern Atlantic Forest of Brazil, with opossums taking advantage of "jellified gum balls" in holes on the trunk of a *Tapirira guianensis* tree (Anacardiaceae), a resource also exploited by the gum-feeding primate the Tufted Marmoset *Callithrix jacchus*. In areas close to human habitation they take advantage of agriculture, orchards and even refuse. (Massoia et al 2000, Smith 2007). Gazarini et al (2008) reported that an individual in Maringá, southern Brazil predated bats caught in bat nets, including at least one example of *Artibeus lituratus* and likely also *Sturnira lilium*. At Estancia Nueva Gambach, San Rafael National Park, they have been seen feeding on mandarin fruits (*Citrus* sp.), fruits of the Pindó Palm (*Syagrus romanzoffiana*) and frequently raid the area around the house in search of chicken and quail eggs from the coup, occasionally killing adult birds without consuming them (Hans Hostettler pers. comm., Smith 2007) - the Spanish name Comadreja overa refers to their fondness for birds eggs. In Misiones, Argentina stomachs contained worms, ants, small birds, eggshell and plant matter (Redford & Eisenberg 1992).

Cáceres (2006) listed the following additional plant species in the diet of this species in Brazil: *Acrocomia sclerocarpa* (Arecaceae), *Cecropia cinerea* (Cecropiaceae), *Miconia* sp (Melostomataceae) and *Cestrum* sp (Solanaceae).

Miziara et al (2008) captured specimens in Tomahawk traps baited with pieces of pumpkin, and a paste of banana, peanut butter, sardines, cornmeal and cod liver oil.

Diet in Captivity Oliveira & Santori (1999) note that the species is immune to the effects of snake venom and studied the technique used in the predation of *Bothrops jararaca* under captive conditions. Juveniles and adults dispatched snakes in the same way. On initial approach the opossum sniffed at the snake, before moving towards the head end and seizing it violently at the back of the head. The snake was then tossed and shook using the mouth and feet for a mean of 9s (+/-4s) until it was subdued. The snake was occasionally released before it was ingested. The snake was then consumed head first while sitting in an erect posture on the hind feet with a mean time for total ingestion of 24 mins 24s (+/-8mins 12s). The snake was held with one forefoot and chewed with the teeth of the same side, whilst the other forefoot was used for additional support in the sitting position. The foot used to hold the snake was changed occasionally with a mean time using the right foot of 8 mins 30s (+/-8mins 56s) and mean time using the left foot of 10 mins 37s (+/-3mins 22s). Similar techniques are used to kill mice and chickens under laboratory observations suggesting that it is not a specialist adaptation to snake predation.

Astúa de Morães et al. (2003) experimentally tested the proportions of protein, lipid, carbohydrate and fibre in the diet of adults (n=6) and juveniles (n=7) of this species under laboratory condtions. Mean proportions per 100g dry weight of food were: protein ad. 20.89g (+/-8.53), juv. 5.58g (+/-2.44); lipid ad. 1.66g (+/-1.49), juv. 1.53g (+/-1.41); carbohydrate ad. 27.90g (+/-7.71), juv. 4.69g (+/-4.92); fibre ad. 1.68% (+/-0.39), juv. 1.19% (+/-0.36). Santori et al (2004) described and illustrated the gut morphology of this species and associated it with dietary habits.

Adult specimens in central Brazil were captured in Tomahawk traps placed in flowering *Caryocar brasiliensis* trees. Small subadults were captured in arboreal Sherman traps. (Mares et al 1989). Mares et al (1996) captured adults in Provincia Tucumán in Havahart traps baited with lunchmeat or sardines.

REPRODUCTIVE BIOLOGY: The stimulus for breeding in *Didelphis* is the amount of daylight and acts primarily on the sexual cycle of the female. (Rademaker & Cerquiera 2006). Astúa de Morães & Geise (2006) captured a pregnant female that was young enough to have been born and reproduce in the same reproductive season.

Seasonality Breeding activity takes place from August to February in Misiones, Argentina (Massoia et al 2006). Two reproductive cycles have been reported during the course of the year in the Argentinian Chaco and in temperate Buenos Aires (Regidor & Gorostiague 1996) but in the Brazilian caatinga only one period of oestrus is recorded annually, timed to coincide with the rains. Rigueira et al (1987) found females with pouched young from August to March in Minas Gerais, though they were much less common in February and March, and all females had pouched young in August and September.

Carusi et al (2009) stated that breeding in Provincia Buenos Aires, Argentina takes place from mid-August to the end of February with two distinct reproductive "events" during that time. Peaks of reproduction in Provincia Buenos Aires are at the beginning of September and in late November or December with the first breeding period accounting for about 70% of the total young produced and only females that conceived early in the first breeding period being able to reproduce a second time (Regidor & Gorostiague 1996).

Regardless of the limited period of female fertility, males seem to be in a constant search for copulation, being violently rejected by non-receptive females for much of the year. However Nogueira (1988) challenged that view and suggested that males show subtle differences in their genital systems throughout the year and can reproduce opportunistically.

Pregnancy Receptive females cede to a brief copulation before chasing the male away and returning to a solitary existence. The gestation period is short, lasting 12-14 days (Tyndale-Bisoce & MacKenzie 1976). Females give birth to 4-13 young in a still embryonic state and less than 15mm in length, these immediately making their way to the pouch and attaching themselves to a teat (Sanborn 1929, Esquivel 2001, Parera 2002, Redford & Eisenberg 1992).

Average litter sizes of 6.2 (Brazilian caatinga), 4.2 (Colombia), 7.1 (Argentina) and 9.4 (Uruguay) have been reported (Parera 2002, Redford & Eisenberg 1992). Rigueira et al (1987) found a mean of 7.04 (+/-1.9, range 2 to 10) in Minas Gerais, Talamoni & Dias (1999) a mean of 6.2 (+/-1.25, n=7) in São Paulo and Oliveira et al (2010) a mean of 5.7 (+/-0.58, n=3) in the same state. Regidor & Gorostiague (1996) gave a range of 4 to 9 young for 41 females captured in Provincia Buenos Aires. Carusi et al (2009) found an average litter size of 8.75 (+/-2.3, n=7) in Provincia Buenos Aires, with no significant difference between the litter sizes in the two annual breeding events 8.83 (+/-2.56) vs8.5 (+/-2.12). They inferred a mean annual production of 17.5 young per female.

Sex ratio has been measured at 1.11 males to females for pouched young in Buenos Aires (Regidor & Gorostiague 1996). The number of young may exceed the number of available teats and those that are unable to feed quickly die.

Rademaker & Cerquiera (2006) demonstrated that latitude has a positive effect on litter size and the duration of the breeding season (which decreases with latitude) is negatively related to litter size. Eisenberg (1989) states that older females produce smaller litters, but Regidor & Gorostiague (1996) found no evidence to support that claim and no correlation between body weight of the mother and litter size. Carusi et al (2009) found no correlation between litter size and nutritional status or physical condition of the mothers.

Talamoni & Dias (1999) noted that two females produced two litters in a 30 day interval. A female in Colombia which had its pouched young removed was in oestrus again when captured 14 days later.

However females maintained in captivity after removal of their young did not return to oestrus and maintenance in captivity may impede the normal oestral cycle. (Tyndale-Briscoe & MacKenzie 1976).

Development During their second month the juveniles leave the pouch and cling to the back of the female returning only to suckle, and are weaned at 3 to 4 months. The testicles of young males descend at the time of weaning (Eisenberg & Redford 1999). Sexual maturity is reached at 9 months according to Talamoni & Dias (1999) or 7.5 months according to Regidor & Gorostiague (1990) but Astúa de Morães & Geise (2006) captured a female with 6 pouched young in Age class 2 (4.5-7 months old), this being younger than all previously documented reproductive females in this species but within the known range for *Didelphis aurita*. For a detailed account of spermatogenesis in this species see Quieroz & Noguiera (2006).

GENERAL BEHAVIOUR: ***Activity Levels*** Though captive individuals have exhibited remarkable social behaviours, wild White-eared Opossums are solitary animals and generally nocturnal in behaviour.

Locomotion Cunha & Vieira (2002) note that *Didelphis* opossums move on thin limbs even when broader and apparently more stable limbs are available, distributing their weight across all four limbs and using the prehensile tail as a fifth limb. All levels of the forest strata are utilised and they are also capable of swimming short distances and frequently do so to cross streams. (Massoia et al 2000).

Home Range Though they are not strictly territorial and even slightly nomadic in behaviour, adults will defend the area occupied at any given time (Novak 1991) and there is apparently a greater tendency towards territoriality in areas of sympatry with Black-eared Opossums (Parera 2002).

A study in Tucumán, Argentina found the average home range to be 5,700m^2 for six animals (Redford & Eisenberg 1992). Home ranges in Argentina averaged 0.57ha (Eisenberg 1989). Densities of 0.4-4.4 per hectare have been recorded in the Caatinga of Brazil and 2.5 per hectare in Tucuman Argentina.

Home range in the Brazilian caatinga was estimated at 7705.3m^2 (+/-5306.3m^2) for males and 5885.4m^2 (+/-4575.3m^2) for females, with a combined sex total of 7022.9m^2 (+/-5047.8m^2) (Streilein 1982c). Almeida et al (2008) estimated daily home ranges in a highly disturbed urban forest fragment in Minais Gerais, Brazil and found that adults of both sexes had greater home ranges than subadults. They recorded the following results: adult male 1100.38m^2 (+/-519.01) subadult male 355.61m^2 (+/-72.51) adult female 1166.65m^2 (+/-279.09) subadult male 541.81m^2 (+/-133.45).

Talamoni & Dias (1999) estimated a mean residence time for males in semideciduous forests of Sao Paulo of 1.3 months (+/-0.9) and for females of 2.8 months (+/-3), the difference between the sexes being significant.

Refuges Adults spend the day in a hollow trunk or other suitable nest hole lined with grass, fur and feathers and emerge at sunset to begin the daily routine. Roost sites are defended ferociously. They sniff the air on emergence and if disturbed can remains motionless for several minutes with the ears directed towards the source of the disturbance. (Massoia et al 2006). Nest holes are changed with regularity. Carusi et al (2009) describe refuges in hollow trunks covered with branches and human rubbish.

An individual in San Rafael National Park roosted in a large fallen log of approximately 80cm diameter adjacent to a Pindo palm tree which it used for foraging (P.Smith pers.obs.). A juvenile individual found in some distress at Hotel Tirol 25 October 2010 curled into a ball in leaf litter in shady vegetation and fell asleep, but otherwise was exposed to the elements (P.Smith pers.obs.). Dias et al (2008) mention a nest in a palm *Attalea speciosa* in Ceará, Brazil.

Grooming Behaviour Juveniles and subadults collected in central Brazil in March, November and December were in various stages of moult, whilst others in May and December were not (Mares et al 1989). A subadult female and a male were moutling in January in Provincia Tucumán, Argentina (Mares et al 1996).

Defensive Behaviour An individual at Pro Cosara hid itself within a bunch of fruits and palm fronds in a Pindó Palm on the approach of an observer and watched quietly (Smith 2007). Though capable of running fairly rapidly on level ground they are agile but somewhat slow movers in the branches of trees and when approached closely threaten with the mouth open (Smith 2007), sometimes also producing a disagreeable smelling glandular secretion from the cloaca (Massoia et al 2006). On rare occasions captured individuals may briefly "play possum", lying prone with the mouth open as though dead (Massoia et al 2000, Parera 2002, Smith 2007), but this is less common than in the North American Virginia Opossum

Didelphis virginiana. If held by the tail with the front feet on the ground they attempt to escape by walking, apparently oblivious to the hand holding their tail. However if the animal is lifted from the ground they immediately attempt to bite, using the powerful prehensile tail to curl the body upwards (Smith 2007).

Streilein (1982a) noted that the species is timid and docile and that hissing, snarling, bared teeth and screeching typically represented an "elaborate bluff". Released individuals rarely climbed, even when trees were nearby, heading instead refuges under rocks or boulders. Talamoni & Dias (1999) found that 56% of released animals (n=104) climbed trees or vines and only 44% remained on the ground.

Mortality This species is frequently preyed upon by felines, foxes, raptors (including *Rupornis magnirostris* and *Tyto alba*) and large snakes such as *Eunectes notaeus* and *Boa constrictor* (Parera 2002). Rodrigues et al (2007) found remains of this species in 9.1% of Maned Wolf *Chrysocyon brachyurus* scats in Brasilia, representing an estimated 6.67% of the total biomass consumed.

In a roadkill study in Santa Catarina, Brazil this species was found to be the second most common victim of traffic constituting 17.1% of the 256 individuals of 20 species sampled (Cherem et al 2007). In other similar studies in Brazil, on the B2-277 bordering PN Iguacu in Paraná State, Brazil *D. aurita* and *D. albiventris* represented 16.2% of the mammals hit by cars (Lima & Obara 2004), whilst this species represented 48.9% of all the roadkill on the RS-040 (Rosa & Mauhs 2004) and 28.8% of roadkill on six rodavias in São Paulo State (Prada 2004).

Carusi et al (2009) suggested that anthropological causes were the major sources of mortality for a population in Provincia Buenos Aires, Argentina and that the population showed no signs of senescence usually associated with individuals around 28 months of age. Individuals killed by electrocution from power lines have been documented in Argentina (Massoia et al 2006).

Parasites Limardi (2006) notes the following ectoparasites of this species in Brazil: Siphanoptera *Craneopsylla minerva* (Stephanocircidae); *Adoratopsylla ronnai* (Ctenophthalmidae); *Ctenocephalides felis* (Pulicidae); *Polygenis tripus, P.rimatus* and *Rhopalosyllus lutzi,* (Rhopalopsyllidae). Acari: Metastigmata *Ixodes loricatus, I.amarali, Amblyomma* sp., *A.cajennense, Ornithodoros talaje* (Ixodidae). Acari: Mesostigmata *Ornithonyssus wernecki* (Macronyssidae); *Androlaelaps fahrenholzi, Gigantolaelaps butantanensis, G.vitzthumi* and *Laelaps mastacalis* (Laelapidae). Acari: Prostigmata *Archemyobia latipilis* and *Archemyobia* sp. (Myobiidae). Acari: Astigmata *Didelphilichus serrifer* (Atopomelidae). For central Brazil Mares et al (1989) add *Gigantolaelaps goyanensis* and *G.oudemansi* (Laelapidae).

Fonseca & Aragão (1952) described *Ixodes didelphidis* from a variety of hosts including this species. It was later synonymised with *I.loricatus* by Labruna et al (2002).Miziara et al (2008) report *Ixodes loricatus* in this species from Campo Grande, Mato Grosso do Sul and Muller et al (2005) note *I.loricatus* (prevalence 36.7%) and *Amblyomma aureolatum* (3.3%) in Rio Grande do Sul. Horta et al (2007) reported *Amblyomma cajennense* and *A.dubitatum* from specimens in São Paulo. Perez et al (2008) found this species to be the main host for immatures of *Amblyomma* ticks (69.1%) in São Paulo, also recording adults of *A.cajennense* (72.4%) and *A.dubitatum* (27.6%)

Guglielmone & Nava (2006) note the Ixodid tick *Amblyomma cajennense* from Argentinian specimens.

Santa Cruz et al (1999) list the following endo and ectoparasites from Corrientes, Argentina with their prevalences in the 25 specimens examined: unidentified Siphanoptera (100%). Ixodidae: *Ixodes loricatus* (16%) and *Rhipicephalus sanguíneus* (20%). Nematoda: *Didelphostrongylus hayesi* (88%), *Turgida turgida* (84%), *Trichuris sp* (4%), *Cruzia tentaculata* (88%), and unidentified Trichostrongylidae. Trematoda: *Duboisiella proloba* (8%), *Zoonorchis goliath* (4%) and *Rhopalias sp.* (92%). Sporozoea: *Cryptosporidium parvum* (24%) and *Isospora sp.* (4%).

Thatcher (2006) lists the following endoparasites of this species in Brazil: Protozoa *Trypanosoma cruzi, Babesia ernestoi.* Ferreira et al (2007) note *Trypanosoma rangeli* in specimens from Minas Gerais. Quintão e Silva & Araujo Costa recorded the following helminths in 22 specimens from Belo Horizonte, Brazil, with their prevalences: *Rhopalias coronatus* 18%, *Brachylaema migrans* 9%, *Aspidodera raillieti* 45%, *Cruzia tentaculata* 91%, *Turgida turgida* 73%, *Gongylonema* sp. 9%, *Viannaia hamata* 27%, *Travassostrongylus orloffi* 14%, *Trichuris didelphis* 36% and *Capillaria* sp. 5%.

Vicente et al (1997) listed the following nematodes in this species from Brazil: *Aspidodera raillieti* Travassos, 1913; *Aspidodera subulata* (Molin, 1860) Railliet & Henry, 1912; *Cruzia tentaculata* (Rud., 1819) Travassos, 1917; *Gnathostoma didelphis* (Chandler, 1932); *Gnathostoma turgidum* Stossich, 1902;

Travassostrongylus travassosi Durette-Desset, 1968; *Viannaia skrjabini* Lent & Freitas, 1937; *Viannaia viannai* Travassos, 1914.

The flagellate protozoan *Tetratrichomonas didelphidis* is found in the intestine, cecum and colon of this species and depends upon *Escherichia coli* as a growth promoting partner. (Tasca & De Carli 2001, 2004, 2007). Navone (1992) documents the Rictulariid nematode *Pterigodermatites* (*Paucipectines*) *kozeki* in this species in Argentina.

Longevity Regidor & Gorostiague (1996) stated that few individuals in Buenos Aires survive more than 20 months in the wild and only survive long enough to participate in one reproductive season.

Physiology Nogueira et al (1999) describe the penile morphology of this species. Cesario & Matheus (2002) describe the ovarian histology, and the structural and the ultrastructural characteristics of the folliculogenesis in this species.

Coutinho et al (1990) the histological structure of the Peyer´s Patches. Cassel et al (2002) described the anatomy of the diaphragm.

Pinto e Silva & Martins (2004) describe the anatomy of abdominal aorta sacral rami, emphasising the common iliac arteries, external and internal iliac arteries and the middle sacral artery. Pinto e Silva et al (2008) describe the morphology of the cranial and caudal mesenteric arteries. Martins et al (2010) describe the structure of the aortic wall.

HUMAN IMPACT: This common marsupial comfortably tolerates the close proximity of humans and in some areas may even actively seek human dwellings for access to food resources. It is likely that human activity has enabled them to considerably extend their range, with deforestation creating optimal habitat (Parera 2002). This species is used as an example of good parenting for educational purposes on account of the way the young are maintained close to the mother by being raised in a pouch (SEAM et al 2001).

Considered a pest species in some areas as they regularly break into to chicken coups to steal eggs and birds (Hans Hostettler pers. comm.) and in Argentina they are actively persecuted for that reason (Massoia et al 2006). In Paraguay three separate individuals were killed raiding the same chicken coup in Alto Verá, Departamento Itapúa during the course of December 2006 (Hans Hostettler pers. comm.). They are attracted to fruiting trees in orchards and gardens where they likely have a low impact on yield (Smith 2007).

Though the species is appreciated for its white meat in the area of Santiago del Estero in Argentina (Parera 2002) it has not been registered in the diet of indigenous tribes in Paraguay (Cartés 2007). In certain areas in Argentina the meat is considered to have curative properties, whilst a skin kept under the bed or a stew made with the tail are both believed to assist in a smooth birth (Massoia et al 2000). In Argentina the fat of the species has been used as a supposed cure for haemorrhoids and skins are used to make coats, though the practice has not been recorded in Provincia Misiones (Massoia et al 2009). Mares et al (1981) note that the species is heavily hunted for skins throughout Provincia Salta.

Alves et al (2010) report that the fat of the species is sold in the markets of Campina Grande, Paraíba State as a treatment for "inguinal bubo" and "furuncles", while Alves & Rosa (2006, 2007) mention that the fat is used to treat hernia and boils in the same state. Alves et al (2009a) note that the fat is made into an ointment that is rubbed on to the affected area as a treatment for arthritis, osteoarthritis, osteoporosis, backache, rheumatism and sprains in the caatinga of Brazil. In Natal, Rio Grande do Norte, the meat is eaten as a treatment for kidney pain and backache (Oliveira et al 2010). In Pernambuco the bones are used to treat cough and osteoporosis (Alves et al 2009b).

Snake venom inhibition is exhibited by the serum of this species which has made it an important laboratory animal (Hingst et al 1998).

Chaga´s Disease The causative agent of Chaga´s disease is *Trypanosoma cruzi*, a digenetic kinetoplastid and enzootic parasite of almost 100 mammal species, including humans. Though typically transmitted to humans via the Reduviid bug *Triatoma infestans*, oral infection with the disease does occur and is often associated with acute forms of the disease. This species is an important natural host for *Trypanosoma cruzi* (Fernandes et al 1991) and Wisnivesky-Colli et al (1992) found infected *Triatoma infestans* in nests of this opossum in Santiago del Estero, Argentina.

Roque et al (2008) found that 8 of 9 specimens that they captured tested serologically positive for *Trypanosoma cruzi* in an area of Santa Catarina State, Brazil that had recently suffered an outbreak of Chaga´s disease. Parasites were recovered from 25% of the animals but the strain could not be determined.

In Ceará State 3 of 5 tested serologically positive. Parasites were recovered from 60% of the animals and were of the TC I strain. Fernandes et al (1984) reported different infection rates according to habitat in Minas Gerais, with 34.9% of opossums infected in wild habitats, 81.8% in rural peridomiciliar areas and just 8.8% in urban areas, with a combined mean infection rate of 36.7%. Dias et al (2008) reported the association of the Triatomine bug *Rhodnius nasutus* (a genus also closely associated with palm trees) with this species in Ceará, and that 16.8% of the bugs carried *Trypanosoma cruzi*. A much smaller number (2 of 521) tested positive for *Trypanosoma rangeli,* though that is non-pathogenic in humans. Fampa et al (2010) also report the presence of the TC II strain in this species in Piauí State, Brazil. The tendency for the animals to approach human dwellings is thought to increase the likelihood of them acting as vectors for infection.

Schweigmann et al (1995) experimentally exposed each of 24 opossums of this species to 10 *Triatoma infestans* bugs infected with *Trypanosoma cruzi* for a period of 23 hours. Ten opossums ate the bugs and of these 40% became infected. Of the remaining 14 opossums that did not eat the bugs 21% were infected through bites. These infection rates were similar to those observed under natural conditions in Santiago del Estero, Argentina (Schweigmann 1994) and suggests that natural infection rates could be reached even if the opossum is only exposed once in its lifetime to an infected vector. Though *Triatoma infestans* is the major vector, Schweigmann et al (1997) also successfully infected the related *T.sordida* and *T.guasayana* by allowing them to feed on an opossum of this species that carried the *Trypanosoma cruzi* parasite.

Leishmaniasis Sherlock et al (1984) documented an individual from Bahía State, Brazil as infected with *Leishmania donovani (=chagasi)*, the first record of infection of a non-canid animal in the wild. Sherlock (1996) also reported *Leishmania amazensis* and *L.braziliensis* from the state, though only 1 animal was found infected with each in a sample of 119 specimens In the same area the known vector of neotropical visceral leishmaniasis *Lutzomyia longipalpis* was also found feeding on trapped opossums. Sherlock et al (1988) also describe experimental infection of this species with the parasite.

Sherlock (1996) noted that the time of greatest abundance of opossums coincided with the greatest abundance of *Lutzomyia longipalpis*. The fact that the species is often found close to human habitation means it plays a potential role in the transmission of this disease and in areas where infected opossums were captured, infections of both humans and domestic dogs had occurred.

Paracoccidioidomycosis Paracoccidioidomycosis (PCM) is the most important and prevalent systemic mycosis in Latin America where it has been recorded principally in Brazil, Colombia and Venezuela. The etiological agent of the disease is the fungus *Paracoccidioides brasiliensis* and infection is primarily through inhalation of the spores (Restrepo et al 2001). Richini-Perreira et al (2008) found roadkill individuals of this species in São Paulo State, Brazil with *P. brasiliensis* which showed evidence of having been in contact with the fungus.

Sarcosproidiosis The pathogenic protozoan *Sarcocystis speeri*, one of the causal agents of the typically mild digestive infection sarcosproidiosis, has been found occurring naturally in specimens of this species in La Plata, Argentina (Dubey et al 2000).

Rocky Mountain Spotted Fever *Rickettsia* is a genus of non-motile spore-forming bacteria carried by ticks, fleas and lice and responsible for a variety of sometimes serious diseases in humans. *R.rickettsii*, causative agent of Rocky Mountain Spotted Fever has been isolated from this species in São Paulo, Brazil (Travassos 1937). Perez et al (2008) suggested that opossums could act as good bioindicators of the prevalence of the disease because of their high tick loads and ease of capture.

Leptospirosis This species is also an important reservoir for leptospirosis, spreading the pathogen *Leptospira interrogans* by excretion but with infected animals showing no obvious pathology (Brihuega et al 2007, Carusi et al 2009). Carusi et al (2009) found 13% of specimens (n=105) in Provincia Buenos Aires to possess antibodies to Leptospira and the presence of *Salmonella enterica* was found in 4% of individuals. It was suggested that these infections were probably contracted via a close association with poultry and that the species probably contributes to infection between poultry farms.

CONSERVATION STATUS: Globally considered to be of Low Risk Least Concern by the IUCN, see http://www.iucnredlist.org/search/details.php/40489/all for the latest assessment of the species. The Centro de Datos de Conservación in Paraguay consider the species to be secure and under no threat in Paraguay, giving it the lowest risk code **N5**. This species is widespread, adaptable and frequently common.

Fluctuations in population have been noted throughout the year. Cáceres (2000) found that the species was up to three times as abundant in spring and summer, than it was in autumn and winter in an urban area. Oliveira et al (2010) however captured more specimens in the winter (dry season) in São Paulo. They attributed these fluctuations to high recruitment of juveniles and a correspondingly high mortality rate for this short-lived species.

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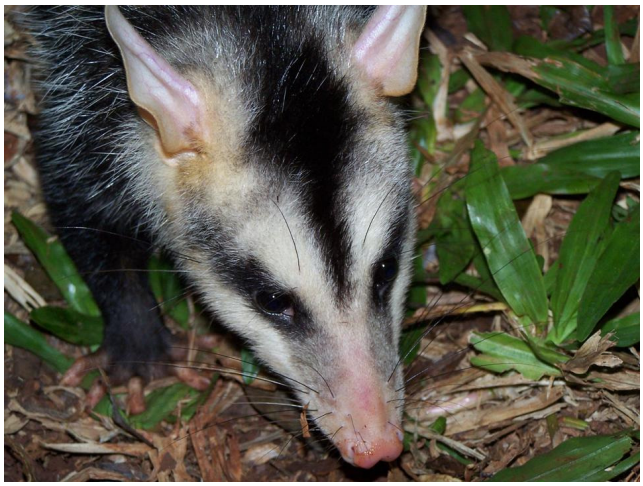

FIGURE 2 - (FPMAM7PH) **White-eared Opossum** *Didelphis albiventris.*
Head detail of adult. Estancia Nueva Gambach, PN San Rafael, Departamento Itapúa, March 2007
Photo Paul Smith.
FIGURE 3 - (FPMAM919PH) **White-eared Opossum** *Didelphis albiventris.*
Juvenile. Hotel Tirol, Departamento Itapúa, October 2010. Photo Paul Smith.

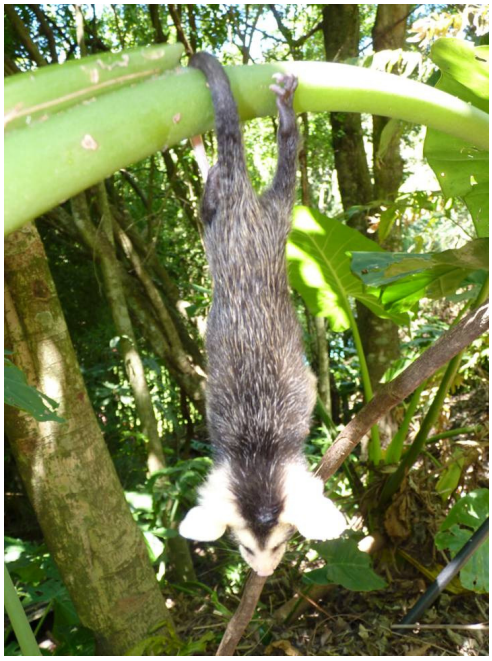

FIGURE 4 - (FPMAM920PH) **White-eared Opossum** *Didelphis albiventris.* Juvenile dorsal view, hanging from prehensile tail.
Hotel Tirol, Departamento Itapúa, October 2010.
Photo Paul Smith.

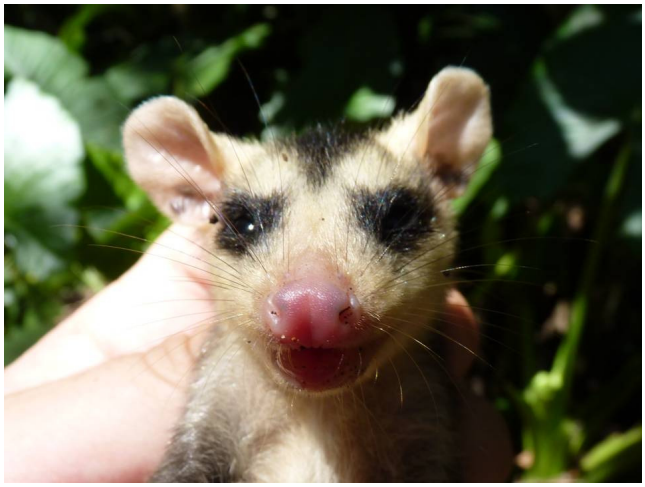

FIGURE 5 - (FPMAM921PH) **White-eared Opossum** *Didelphis albiventris.*
Juvenile frontal head view. Hotel Tirol, Departamento Itapúa, October 2010. Photo Paul Smith.
FIGURE 6 - (FPMAM9PH) **White-eared Opossum** *Didelphis albiventris.*
Adult footprints. Mbaracayú Biosphere Reserve, Departamento Canindeyú, October 2008. Photo Paul Smith.

FIGURE 7 - (FPMAM922PH) **White-eared Opossum** *Didelphis albiventris.*
Juvenile fore foot. Hotel Tirol, Departamento Itapúa, October 2010. Photo Paul Smith.
FIGURE 8 - (FPMAM923PH) **White-eared Opossum** *Didelphis albiventris.*
Juvenile hind foot. Hotel Tirol, Departamento Itapúa, October 2010. Photo Paul Smith.