

# Peaceless doves: predators of two columbid species at an urban park in southeastern Brazil

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**ABSTRACT:** Doves are preyed on by a variety of vertebrate predators including mammals, birds, and snakes. In urban areas the predator diversity is restricted to a few species, and hawks are the commonest dove predators there. Herein we report events of predation on the Eared Dove (*Zenaida auriculata*) and the Picazuro Pigeon (*Patagioenas picazuro*) by two accipitrid raptors, the Roadside Hawk (*Rupornis magnirostris*) and the Plumbeous Kite (*Ictinia plumbea*), a falconid, the Aplomado Falcon (*Falco femoralis*), besides a dipsadid snake, the Eastern Green Whiptail (*Philodryas olfersii*), at an urban park. The doves were hunted mostly during their fledgling stages. The Plumbeous Kite hunted Eared Doves only during its breeding season to feed the offspring, whereas the Roadside Hawk preyed both on Eared Doves and the Picazuro Pigeon also during its non-breeding period. The Aplomado Falcon preyed on an adult Picazuro Pigeon, whereas the Eastern Whip Snake preyed on a nestling Eared Dove. The Roadside Hawk was the main predator of the Eared Dove in the studied park, and probably would prove to be an important predator of this and additional dove species at other urban areas.

**KEY-WORDS:** Accipitridae, anthropogenic area, Dipsadidae, raptors, snake.

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Neotropical pigeons and doves (Columbidae) dwell in diverse habitat types, but most species are found in open areas where they feed mainly on seeds (Baptista *et al.* 1997, Sick 1997, Dardanelli *et al.* 2011). Some dove species breed year-round and colonise anthropogenic habitats (Baptista *et al.* 1997, Sick 1997, Develey & Endrigo 2004, Corbo *et al.* 2013). Columbids fall prey to a diverse array of vertebrate predators including mammals, birds, and snakes (Silva & Faggioni 2015, Sarasola *et al.* 2016). Among raptors, a few hawk and kite species prey on doves, although birds are not their staple food (Thiollay 1994, Seavy *et al.* 1997, Sick 1997). Several Neotropical dove species dwell in urban areas, particularly in so called green areas, which harbour a few accipitrid and falconid raptor species as well (Thiollay 1994, Baptista *et al.* 1997, Sick 1997, Dardanelli *et al.* 2011, Corbo *et al.* 2013). In urban areas the predator diversity is restricted to a few species, and hawks are the commonest dove predators there (Thiollay 1994, Sick 1997). Besides raptors, in anthropogenic areas doves may fall prey to a few snake species that dwell there as well (Sazima & Marques 2007, Barbo *et al.* 2011).

Among the dove species that fare well in urbanised areas in Brazil, the Eared Dove (*Zenaida auriculata*) and the Picazuro Pigeon (*Patagioenas picazuro*) are the most

conspicuous and common ones (Develey & Endrigo 2004, Corbo *et al.* 2013). Herein we report events of predation on the Eared Dove and the Picazuro Pigeon by two accipitrid raptors, the Roadside Hawk (*Rupornis magnirostris*) and the Plumbeous Kite (*Ictinia plumbea*), besides a falconid, the Aplomado Falcon (*Falco femoralis*) and a dipsadid snake, the Eastern Green Whiptail (*Philodryas olfersii*) at an urban park in southeastern Brazil.

We observed predation on doves at the Parque Ecológico Prof. Hermógenes de Freitas Leitão Filho (22°48'42"S; 47°04'26"W, 587 m a.s.l) in Campinas, São Paulo state, southeastern Brazil. This recreational park is bordered by residential quarters and buildings of a local university (see map in D'Angelo *et al.* 2016). The park has a total area of 0.13 km<sup>2</sup>, of which about 75% is occupied by a large pond surrounded by native and exotic vegetation composed of trees, bushes and grass patches. The pond is bordered by a sandy path about 1.5 km long, used by people for walking, running, and promenading. Playgrounds, kiosks, benches and tables, as well as wastebaskets along the path accentuate the recreational nature of the study site.

Since observations of predation events on a particular prey type usually are fortuitous and circumstantial (Sazima 2008, 2015a), our records were opportunistic and spanned

six years, from 2010 to 2016, at different periods of the day and the year. We observed the predation events with bare eye, 10 × 15 binoculars, and through a 70–300 mm telephoto lens mounted on a SLR camera from a distance of 2 to 30 m. Throughout the observational sessions, we used the “*ad libitum*” and “sequence” samplings (Altmann 1974), which are adequate to record fortuitous or rare events. Voucher digital photographs of the predators and/or their prey are on file at the Museu de Zoologia da Universidade Estadual de Campinas (ZUEC).

We recorded a total of 12 predation events involving two dove species, the Eared Dove and the Picazuro Pigeon, preyed on by three raptor species, the Roadside Hawk, the Plumbeous Kite, and the Aplomado Falcon, besides a snake, the Eastern Green Whiptail. The doves were preyed on mostly during their fledgling stages (Table 1). The Plumbeous Kite was observed to hunt Eared Doves only during its reproductive season and fed this prey type to the offspring, whereas the Roadside Hawk was observed to prey both on Eared Doves and the Picazuro Pigeon during its reproductive and non-reproductive periods. The Aplomado Falcon preyed on an adult Picazuro Pigeon, and the Eastern Whip Snake preyed on a nestling Eared Dove.

Most of the recorded predatory events consisted of raptors carrying their prey in talons and flying among the vegetation or in the open. On a few occasions we spotted the raptors perched on a branch and plucking feathers from, or tearing pieces of, the prey, only to fly upon the approximation of a passerby. However, some of the observed events allowed a description of an almost complete predation sequence. For instance, at midday of 04 May 2014, we observed an adult Roadside Hawk that grasped an Eared Dove nestling by the back from within an unattended nest, and carried the prey to a branch nearby. The still alive dove was held in right talons by its wing (Fig. 1A) and soon after alighting the hawk began to pluck the body feathers from the prey. The raptor pecked at the back of the prey first, and began to tear

and swallow small pieces from there. Our observation ended when a passerby caused the hawk to fly out of our visual reach.

At late afternoon of 14 July 2014, we observed a juvenile Roadside Hawk descending upon a juvenile Picazuro Pigeon that was foraging on the ground in the open. The hawk pulled the dove against the ground with both feet, then grabbed it by the neck and carried the prey in the right talons with visible effort and perched on a branch nearby. There, the hawk began to rip and swallow pieces of the prey's upper back. A passerby disturbed the hawk, which fled with the already dead prey to the understory. On the way it released the prey, which landed on the ground, the wounded back clearly visible (Fig. 1B). The hawk perched on a tree near the fallen dove, and after about 15 min it landed and carried the prey out of sight.

At midday of 10 October 2012, we observed a Plumbeous Kite flying low and striking in midair at the back of a clumsily flying Eared Dove fledgling that left a branch and was set to alight on another branch nearby. The kite carried the prey to a pole, where it plucked several feathers but did not rip or ate portions of the prey. Instead, the prey was carried to a nest nearby, where the kite (now clearly a male) delivered the dove to a female that was tending her single nestling. The female held the dove with right talons (Fig. 1C), tore small pieces of the prey and delivered them to the nestling.

At late morning of 27 December 2015 we observed an Eastern Green Whiptail foraging among branches (Fig. 1D) of a treelet that harboured an Eared Dove nest. The brooding adult flew off at the approximation of the snake. The now unattended nest contained a single, recently-hatched nestling, which the snake grabbed by the neck and began to swallow headfirst. Soon after, the snake was mobbed by a pair of Pale-breasted Thrushes (*Turdus leucomelas*) and a Streaked Flycatcher (*Myiodynastes maculatus*), which caused the predator to quickly retreat to a dense shrubbery, the nestling still in its mouth.

**Table 1.** Predators of two columbid species at an urban park in Campinas, São Paulo state, southeastern Brazil, over six years.

Predator	Prey	Life stage	Date
Roadside Hawk (adults)	Eared Dove	Fledgling	04 December 2010
	Eared Dove	Fledgling	09 January 2011
	Eared Dove	Fledgling	19 January 2013
	Eared Dove	Nestling	04 May 2014
	Eared Dove	Adult	20 August 2015
Juvenile	Picazuro Pigeon	Juvenile	14 July 2014
Adult	Picazuro Pigeon	Fledgling	12 June 2015
Plumbeous Kite (adults)	Eared Dove	Fledgling	10 October 2010
	Eared Dove	Fledgling	11 October 2015
	Eared Dove	Fledgling	25 October 2015
Aplomado Falcon (juvenile)	Picazuro Pigeon	Adult	21 December 2016
Eastern Green Whiptail	Eared Dove	Nestling	27 December 2015



**Figure 1.** Columbid predators at an urban park in southeastern Brazil. With an Eared Dove (*Zenaida auriculata*) nestling still alive in talons, a watchful Roadside Hawk (*Rupornis magnirostris*) adult perches on a branch (A); a Picauro Pigeon (*Patagioenas picazuro*) juvenile killed and temporarily left on the ground by a Roadside Hawk juvenile (B); a Plumbeous Kite (*Ictinia plumbea*) female feeds her young pieces she rips from an Eared Dove fledgling (C); its head visible among leaves, an Eastern Green Whiptail (*Philodryas olfersii*) searches for nests among branches (D).

At mid-afternoon of 21 December 2016, we recorded a juvenile Aplomado Falcon feeding on an adult Picauro Pigeon at the park. The falcon was on the ground with its wings spread over the prey, and tore pieces of the pigeon's chest. The prey's head and part of the chest and belly were already consumed, revealing seeds eaten by the dove. A passerby disturbed the falcon, which flew to a nearby tree and watched. However, it was spotted by a group of Chalk-browed Mockingbirds (*Mimus saturninus*), whose members mobbed the falcon until the raptor left the site.

At midmorning of 09 January 2011 we observed a Roadside Hawk perched on a branch, cleaning the toes and bill from vestiges (blood, small tissue pieces) of a recent meal. A few spotted plumes characteristic of a fledgling Eared Dove were found under the perch. During the cleaning session, the hawk was vigorously mobbed by a Streaked Flycatcher and a Greater Kiskadee (*Pitangus sulphuratus*) until it flew off the park.

The Roadside Hawk was the main predator of the two dove species at the studied park, where it is common and probably hunts there often (Corbo *et al.* 2013). This raptor feeds mostly on insects and rodents (Beltzer 1990, Thiollay 1994, Baladrón *et al.* 2011), but at the study park it was observed to feed on fledgling and nestling birds

only. Preying on Eared Dove fledglings and nestlings was observed at other sites near the park, and perhaps this feeding habit is more widespread than our results may indicate. A juvenile hawk was observed taking a nestling dove from within a nest in a backyard (G.B. D'Angelo, pers. comm.), and an adult was observed with a juvenile dove in talons at a parking lot adjacent to the study site (I.S., pers. obs.) to mention two additional records. Insect prey was observed only once near the park, a caterpillar caught on a tree by a juvenile hawk (Corbo *et al.* 2013).

In southern and southeastern Brazil, the Roadside Hawk breeds during the austral spring (Santos *et al.* 2009, I.S., pers. obs.). Thus, predation on doves by this hawk is not restricted to its breeding period. On the other hand, predation on birds, including the Eared Dove, seems restricted to the breeding season of the Plumbeous Kite, also in the austral spring (Loures-Ribeiro *et al.* 2003, Sazima 2008). However, in southern Brazil, only insects were fed to nestlings of this kite (Jacomassa 2011), which agrees with the general diet recorded for the Plumbeous Kite in Brazil and elsewhere in the Neotropics (Sick 1994, Seavy *et al.* 1997, Sazima 2008). Food delivered to nestlings both of the Roadside Hawk and the Plumbeous Kite, which demand an energetically rich diet, plausibly has an important proportion of vertebrates including

birds (Panasci & Whitacre 2000, Sazima 2008, present paper).

The Aplomado Falcon preys on insects and small vertebrates, including birds (White *et al.* 1994, Sick 1997). Studies on the feeding habits of this falcon in Mexico and Argentina indicate that birds are the most important component in the diet of this raptor, including the Picazuro Pigeon and the Eared Dove (Hector 1985, Bó 1999, Salvador 2012), which agrees with our observations at the study park.

The Eastern Green Whiptail feeds mostly on rodents and reptiles, but birds are present in its diet as well (Hartmann & Marques 2005). Indeed, this snake is a skilled bird hunter able to catch adult passerine birds and is mobbed whenever spotted by mockingbirds and other passerines (Sazima & Marques 2007, Sazima 2015b). Thus, its preying on an Eared Dove nestling would not come as a surprise, and possibly this snake is an important predator on the dove and other bird nestlings in anthropogenic areas.

In conclusion, at a small urban park in southeastern Brazil, a falconid and two accipitrid raptors seem to regularly prey on two dove species. Our observations indicate that the Roadside Hawk preys on doves throughout the year, whereas the Plumbeous Kite restricts predation on doves to its breeding season, when it migrates to the region (Corbo *et al.* 2013). Additionally, a dipsadid snake occasionally preys on one of the dove species.

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