

Where to watch raptor migration in South America

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In the second, and final, part in our series describing where to watch raptor migration in the Neotropics, Matias Juhant takes us on a whistle-stop tour of raptor watchpoints across South America. As we will discover, there is still much to be learned and plenty of opportunities for interested birdwatchers to make a contribution to our cumulative knowledge.

Although South America has the world's richest avifauna, bird migration within the continent is largely unknown¹¹. Raptors provide a good example of how little we know concerning this phenomenon. The most complete overview of raptor migration in South America was published ten years ago by Zalles & Bildstein³¹, who demonstrated for the first time the different migration routes, and described 20 potential watchsites for the establishment of long-term monitoring programmes. That said we still lack raptor-monitoring sites, and information on the main wintering areas, bottlenecks, and details of migration routes in South America. Here, I examine our current knowledge of raptor migration in South America and describe 35 sites to watch raptors on migration in the continent.

Raptor migration systems in South America

Ninety-six species of raptors occur in South America, 45 of which (47%) migrate in parts of their ranges. Five species are 'complete' migrants, 23 'partial' migrants and 17 'irruptive or local' migrants. These species occur in three migration systems (Table 1).

Nearctic–Neotropical system.—This includes species that breed in the Nearctic and over-winter in the Neotropics. In South America 12 species are involved. Four are complete migrants and eight partial migrants. These reach South America via the Mesoamerican Land Corridor (the principal route) or via the Caribbean Sea.

Neotropical–Intra-tropical system.—These are species that breed at tropical and subtropical latitudes, and over-winter within the tropical belt. Twenty-three species are involved, 11 of them are partial migrants, and 12 are irruptive or

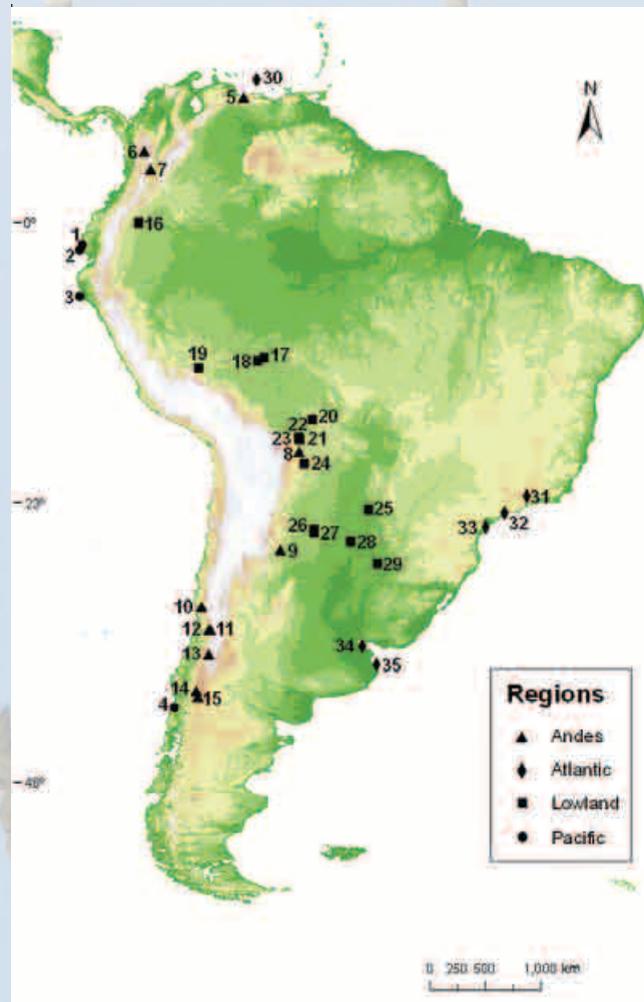


Figure 1. Geographic location of the 35 raptor watchsites of South America. Site numbers correspond to those in the main text (which see).

Table 1. Raptor species that migrate within South America. Regular migrant (x), vagrant migrant (v) and uncertain status (?).

	Nearctic- Neotropical	Neotropical- Intra-tropical	Austral- Neotropical		Nearctic- Neotropical	Neotropical- Intra-tropical	Austral- Neotropical
'Complete' migrants				Chimango Caracara <i>Milvago chimango</i>	-	-	x
Osprey <i>Pandion haliaetus</i>	x	-	-	American Kestrel <i>Falco sparverius</i>	x	-	x
Mississippi Kite <i>Ictinia mississippiensis</i>	x	-	-	Aplomado Falcon <i>F. femoralis</i>	-	-	x
Broad-winged Hawk <i>Buteo platypterus</i>	x	-	-	Merlin <i>F. columbarius</i>	x	-	-
Swainson's Hawk <i>B. swainsoni</i>	x	-	-	Peregrine Falcon <i>F. peregrinus</i>	x	-	x
White-throated Hawk <i>B. albigula?</i>	-	-	x	'Irruptive or local' migrants			
'Partial' migrants				Lesser Yellow-headed Vulture	-	x	x
Black Vulture <i>Coragyps atratus</i>	-	x	x	<i>Cathartes burrovianus</i>			
Turkey Vulture <i>Cathartes aura</i>	x	x	x	Greater Yellow-headed Vulture <i>C. melambrotus</i>	-	x	-
Hook-billed Kite <i>Chondrohierax uncinatus</i>	-	x	-	Andean Condor <i>Vultur gryphus</i>	-	x	x
Swallow-tailed Kite <i>Elanoides forficatus</i>	x	x	-	White-tailed Kite <i>Elanus leucurus</i>	-	-	x
Snail Kite <i>Rostrhamus sociabilis</i>	-	?	x	King Vulture <i>Sarcoramphus papa</i>	-	?	x
Rufous-thighed Kite <i>Harpagus diodon</i>	-	x	-	Slender-billed Kite <i>Rostrhamus hamatus</i>	-	x	-
Plumbeous Kite <i>Ictinia plumbea</i>	-	x	-	Savanna Hawk <i>Buteogallus meridionalis</i>	-	?	x
Northern Harrier <i>Circus cyaneus</i>	v	-	-	Great Black Hawk <i>B. urubitinga</i>	-	?	x
Cinereous Harrier <i>C. cinereus</i>	-	-	x	Black-collared Hawk <i>Busarellus nigricollis</i>	-	?	x
Long-winged Harrier <i>C. buffoni</i>	-	-	x	Short-tailed Hawk <i>Buteo brachyurus</i>	-	?	x
Rufous-thighed Hawk <i>Accipiter erythronemius</i>	-	?	x	Zone-tailed Hawk <i>B. albonotatus</i>	-	x	-
Cooper's Hawk <i>A. cooperi</i>	v	-	-	Rufous-tailed Hawk <i>B. ventralis</i>	-	-	x
Chilean Hawk <i>A. chilensis</i>	-	-	x	Carunculated Caracara <i>Phalacrocorax carunculatus</i>	-	x	-
Black-chested Buzzard-Eagle <i>Geranoaetus melanoleucus</i>	-	?	x	Mountain Caracara <i>P. megalopterus</i>	-	-	x
White-tailed Hawk <i>Buteo albicaudatus</i>	-	?	x	White-throated Caracara <i>P. albogularis</i>	-	-	x
Variable Hawk <i>B. polyosoma</i>	-	?	x	Striated Caracara <i>P. australis</i>	-	-	x
Red-tailed Hawk <i>B. jamaicensis</i>	v	-	-	Yellow-headed Caracara <i>Milvago chimachima</i>	-	?	x
Southern Caracara <i>Caracara plancus</i>	-	-	x	Totals	12	23	29
						(12?)	

local migrants. There is no evidence of any major flyways in this system.

Austral-Neotropical system.—These are species that breed at temperate latitudes and over-winter north of their breeding range within South America. Twenty-nine species are involved, one complete migrant, 16 partial migrants and 13 irruptive or local migrants. The principal flyways appear to be the western and eastern slopes of the Andes, central Argentina, and the Atlantic coast.

South American flyways

Nearctic-Neotropical migrants reach South America via two flyways. The principal one is the Mesoamerican Land Corridor, which involves nine species such as vultures and hawks, and at least two million individuals, whereas a minor

flyway crosses the Caribbean, involving four species such as Osprey *Pandion haliaetus* and some falcons, with the total number of migrants still unknown. Once they reach Colombia, Turkey Vultures *Cathartes aura* and Broad-winged Hawks *Buteo platypterus* fan out across northern South America. Apparently, Turkey Vultures reach northern Colombia and cross the Andes in the vicinity of Cúcuta (dpto. Norte de Santander) to over-winter in the Venezuelan Llanos (http://www.vulturemovements.org/hms/hms_tv.htm), whereas Broad-winged Hawks disperse along the Andes⁹ with some individuals reaching as far south as north-west Argentina²⁷. Swallow-tailed Kites *Elanoides forficatus* move through Colombia along the Pacific slope, crossing east over the Andes in north-east Ecuador to reach the Amazonian lowlands of Peru and Brazil, and even as far south

as eastern Paraguay and eastern Brazil³². Swainson's Hawks *Buteo swainsoni* migrate over the eastern slope of the Cordillera Central and the western slope of the Cordillera Oriental in northern and central Colombia, enter the lowlands, and then migrate due south to the Argentine Pampas^{8,16}. In contrast, Osprey and Peregrine Falcon *Falco peregrinus* migrate across a broader front, using both flyways to reach their wintering areas^{8,18,19} (http://www.frg.org/SC_PEFA.htm). Both species use the continent's coasts as migration routes, as well as crossing over the Andes in Colombia to reach the Amazonian lowlands, and as far south as Argentina and Chile³¹.

Neotropical–Intra-tropical raptors appear to move in response to seasonal shifts in rainfall³¹. The Serra da Mantiqueira, in south-east Brazil, is the only evidence of a 'leading line' within this system and it is used by Rufous-thighed Kites *Harpagus diodon*³.

Austral–Neotropical migrants include three species for which satellite-tracking data are available—Turkey and Black Vultures *Coragyps atratus* and White-throated Hawk *Buteo albigula*—although these are to date unpublished. White-throated Hawk apparently migrates in a narrow front following the Andes and crossing the equator to reach as far north as Colombia². Others, such as Turkey Vultures breeding in central Argentina move due north to over-winter in the lowlands east of the Andes (Bolivia and Brazil), whereas Black Vultures migrate short distances within the Argentine Pampas (http://www.vulturemovements.org/hms/hms_tv.htm). Snail Kite *Rostrhamus sociabilis* is another somewhat broad-frontal migrant that it is recorded at many of South America's watchsites. At some of them, counts can exceed 10,000 kites^{13,31}.

Migration watchsites

Raptor migration can be observed at 35 watchsites in South America (Fig. 1). To enable a clear vision and better knowledge of raptor migration across the continent, I have divided the watchsites into four regions: (1) the *Pacific region* covers the entire Pacific coast; (2) the *Andes region* covers the Andean mountains; (3) the *Lowland region* encompasses the lowlands east of the Andes; and (4) the *Atlantic region* incorporates the entire Atlantic coast including the islands off the north coast of the continent. In the text below, the migration times of the different raptor species is based on the Southern Hemisphere seasons, i.e. austral spring (September–December) and austral autumn (March–June).

Pacific region.—Four watchsites (three in the southern equatorial region and one in the southern temperate zone). Standard migration data are unavailable from anywhere in this region. Eleven species have been recorded including two smaller vultures, Andean Condor *Vultur gryphus*, Osprey, White-tailed Kite *Elanus leucurus*, Cinereous Harrier *Circus cinereus*, Chilean Hawk *Accipiter chilensis*, two caracaras and two falcons. The principal migrants are Osprey and boreal Peregrine Falcons³¹ (http://www.frg.org/SC_PEFA.htm).

(1) Roca Montañita (01°81'S 80°76'W), Guayas, Ecuador; sporadic observations in 1987–90. Two species have been observed in October and May, namely Osprey and Peregrine Falcon³¹.

(2) Salina / Santa Rosa (02°02'S 81°00'W), Guayas, Ecuador; sporadic observations in 1987–90. Two species have been observed in October and May, namely Osprey and Peregrine Falcon³¹.

(3) Cerro Illesca (06°00'S 81°00'W), dpto. Piura, Peru; two years of counts in 1980–82. Two species have been observed between October and April, namely Osprey and Peregrine Falcon (90 individuals in 1980–82)^{28,31}.

(4) Valdivia wetland (39°78'S 73°25'W), Region X, Chile; sporadic observations in 1987–93. Eleven species have been observed. Osprey appears to be the principal migrant³¹.

Andes region.—Eleven watchsites (three in northern and one in the southern equatorial regions, and seven in the southern temperate zone). Only Fredonia (Colombia) possesses detailed data on raptor migration. Twenty-two species have been recorded in this region including two vultures, Osprey, two kites, two harriers, nine hawks, three caracaras and three falcons. The principal migrants are Broad-winged, Swainson's and White-throated Hawks^{2,9,16,31}.

(5) Paso de Portachuelo (Parque Nacional Henri Pittier, 10°35'N 67°68'W), Aragua, Venezuela; four years of counts in 1991–94. Five species have been observed in August–November and in March–April. Osprey (mean 16 in spring; peak October) and Peregrine Falcon (mean four in spring) are the principal migrants^{17,31}.

(6) Fredonia (05°90'N 75°71'W), dpto. Antioquia, Colombia; six years of migration counts in 1999–2004. Ten species have been observed in October–mid November and in mid March–mid April. Broad-winged (mean 23,350 in spring; peak mid October / mean 21,900 in autumn; peak mid

March) and Swainson's Hawks (mean 19,070 in spring; peak late October–early November / mean 18,370 in autumn; peak late March–early April) are the principal migrants⁴.

(7) Cañon de Cambeina (04°45'N 75°25'W), dpto. Tolima, Colombia; based on a newspaper report. Two species observed in February–April, namely Broad-winged and Swainson's Hawks³¹.

(8) Masicuri (18°78'S 63°13'W), dpto. Santa Cruz, Bolivia; casual observations in 1993 and an organised count in 2000. Thirteen species have been observed in November and one in March. Swainson's Hawk (2,917 birds in mid November / 10,000–13,000 in mid March) is the principal migrant^{20,31}.

(9) Tafí del Valle (26°86'S 64°68'W), Tucumán, Argentina; casual observations in 2002–03. One species observed in late August and in April, namely White-throated Hawk³⁰.

(10) Reserva Nacional Chinchillas (31°05'S 71°01'W), Region IV, Chile; observations in 1993–95. Three species have been observed in August–September and in February–April. Variable Hawk *Buteo polyosoma* appears to be the principal migrant³¹.

(11) Moquehue (38°92'S 71°36'W), Neuquén, Argentina; a migration count in 2008. Eight species have been observed in mid March–early April. White-throated Hawk (96 individuals; peak 18 on 23 March) and Variable Hawk (33 individuals; peak 9 on 17 March) are the principal migrants¹⁵.

(12) Lonquimay (38°04'S 71°53'W), Region IX, Chile; single day-counts on 9 and 11 April 2004–05. Three species have been observed, namely White-throated (21 and 14 individuals on 9 and 11 April) and Variable Hawks (15 individuals on 11 April)³⁰.

(13) Farellones (33°36'S 70°35'W), Metropolitan Region, Chile; migration counts in 1996–98. One species has been observed, with White-throated Hawk (256 individuals in mid March–early April; peak March) apparently the principal migrant²⁶.

(14) San Carlos de Apoquindo (33°38'S 70°51'W), Metropolitan Region, Chile; sporadic observations. Six species have been observed between May and November, with Variable Hawk apparently the principal migrant³¹.

(15) San Carlos de Apoquindo (33°04'S 70°46'W), Metropolitan Region, Chile; migration counts in 1987–88. One species has been observed, with White-throated Hawk (35 individuals in October) apparently the principal migrant²⁷.

Lowland region.—Fifteen watchsites (11 in the southern equatorial zone and four in the southern temperate zone). Only Concepción (Bolivia) possesses detailed data on raptor migration.

Thirty-two species have been recorded including five vultures, Osprey, seven kites, two harriers, 12 hawks, two caracaras and three falcons. The principal migrants are Mississippi Kite *Ictinia mississippiensis* and Snail Kite^{22–24,31}.

(16) Estación Biológica Cuyabeno (00°00'S 76°16'W), dpto. Sucumbios, Ecuador; casual observations. Six species have been observed³¹.

(17) Riberalta (11°00'S 66°00'W), dpto. Beni, Bolivia; casual observations. Four species have been observed in April, with Mississippi Kite apparently the principal migrant³¹.

(18) Hacienda Santa Rosa (11°33'S 66°45'W), dpto. Pando, Bolivia; a single-day count on 8 November 1991. One species has been observed, with Swallow-tailed Kite (c.10,000 individuals) apparently the principal migrant³¹.

(19) Estación Biológica Cocha Cashu (11°91'S 71°03'W), dpto. Madre de Dios, Peru; sporadic observations in 1974–84. Four species have been observed in October. Mississippi Kite appears to be the principal migrant³¹.

(20) Concepción (16°13'S 62°03'W), dpto. Santa Cruz, Bolivia; casual observations from the mid 1980s and during organised counts in 2000, 2001, 2003 and 2009. Twenty species have been observed in mid September–November and 16 in March–early April. Black Vulture (mean 895 in spring / mean 811 in autumn) and Mississippi Kite (mean 132,080 in spring; peak mid October–mid November / mean 4,710 in autumn; peak March) appear to be the principal migrants^{5,14,20,22–25,31}.

(21) Viru-Viru airport (17°06'S 63°01'W), dpto. Santa Cruz, Bolivia; casual observations in 1992–94 and an organised count in 2000. Thirteen species have been observed in November and one species in February. Snail Kite (single-day count of 20,000 in February / 30,000 birds over three days in November) and White-tailed Hawk *B. albicaudatus* (477 birds in November) are the key species involved^{20,21,31}.

(22) Jardín Botánico de Santa Cruz (17°76'S 63°01'W), dpto. Santa Cruz, Bolivia; casual observations over several years and an organised count in 2000. Ten species have been observed in October–November. Black Vulture and Snail Kite appear to be the principal migrants^{20,31}.



Figure 2 (top). Swainson's Hawks *Buteo swainsoni* arriving at their winter quarters in the eastern pampas of Punta Rasa, Argentina. At Punta Rasa, in mid November, if the winds are westerly or southerly, it is possible to tally thousands of these hawks in a single day. Most of those tallied at this site are immatures (Gabriel Battaglia)

Figure 3 (bottom). These White-throated Hawks *Buteo albigula*, adult (at left) and juvenile (right), are migrating over the temperate forest of Moquehue, Argentina, heading for Chile. This is the only Austral-Neotropical migrant for which evidence exists that the species migrates over the Atacama Desert and crosses the equator (Sergio H. Seipke)



Figures 4–6. Immature Variable Hawks *Buteo polyosoma*; from top and left to right below, first-, second- and third-years in their wintering ground around Tafí del Valle, Tucumán, Argentina. Each winter large numbers of immatures congregate in this region to feed on the large local rodent population. Some of these hawks might come from as far south as Tierra del Fuego (Matias A. Juhant)

(23) Parque Regional Lomas de Arena (17°88'S 63°08'W), dpto. Santa Cruz, Bolivia; casual observations over several years. One species has been observed in November, namely Snail Kite (single-day count of 500 individuals on 24 November 1994)³¹.

(24) Rancho San Julián (19°78'S 62°07'W), dpto. Santa Cruz, Bolivia; casual observations in 2003. One species has been observed in March, namely Snail Kite (c.180 individuals)⁷.

(25) Middle Paraguay River (20°21'S 57°66'W), Paraguay; count from a boat in 1988–89. Eight species have been observed in August–October and March. Snail Kite appears to be the principal species^{10,31}.

(26) Fuerte Esperanza (25°18'S 61°91'W), Chaco, Argentina; a single day-count on 20 February 2002. One species has been observed, with Mississippi Kite (c.10,000 birds) apparently the principal migrant¹.

(27) Reserva Provincial Loro Hablador (25°46'S 61°09'W), Chaco, Argentina; casual observations over several years. Two species have been observed in spring, namely Mississippi Kite and Swainson's Hawk¹.

(28) Estación Biológica El Bagual (26°16'S 58°93'W), Fomosa, Argentina; casual observations over several years. Snail Kite appears to be the principal migrant in October and March⁶.

(29) Estancia Santa Teresa (28°01'S 56°75'W), Corrientes, Argentina; casual observations since 1980. Four species have been observed in between January and March. Mississippi Kite appears to be the principal migrant³¹.

Atlantic region.—Six watchsites (one each in northern and southern equatorial regions, and four in the temperate zone). Only Punta Rasa (Argentina) possesses detailed data on raptor migration. Twenty-two species have been recorded including Turkey Vulture, Osprey, six kites, two harriers, six hawks, two caracaras and four falcons. The principal migrants are Snail Kite and Swainson's Hawk^{13,31}.

(30) Archipiélago de Los Roques (11°78'N 66°56'W), Caribbean Sea, Venezuela; sporadic observation in 1992–93. Two species have been observed between August and January, namely Osprey and Peregrine Falcon³¹.

(31) Parque Nacional Itatiaia (22°27'S 44°36'W), Rio de Janeiro, Brazil; count in 2005. One species

has been observed in mid March, namely Rufous-thighed Kite (129 individuals)³.

(32) Cubatão and Santos mangrove swamps (23°88'S 46°36'W), São Paulo, Brazil; observations in 1994–96. Two species have been observed in spring and autumn, namely Osprey and Peregrine Falcon³¹.

(33) Ilha do Cardoso (25°05'S 47°09'W), São Paulo, Brazil; observations in 1989–95. Nine species have been observed in November–December and in April³¹.

(34) Reserva Natural Punta Lara (34°81'S 57°96'W), Buenos Aires, Argentina; casual observations over several years. Three species have been observed in October–November and in March–April, namely Snail Kite, and Swainson's and White-tailed Hawks (L. G. Pagano and J. I. Areta pers. comm.).

(35) Punta Rasa (36°28'S 58°76'W), Buenos Aires, Argentina; observations since the early 1990s and an organised count in 2008. Sixteen species have been observed in mid September–November. Snail Kite (single-day count of c.10,000 on 1 November 2007) and Swainson's Hawk (single-day count of 5,000–10,000, mid November) appear to be the principal migrants^{12,13,31}.

Conservation implications

A lack of ornithologists, a paucity of knowledge concerning relevant bird behaviour, and the lack of financial support for avian research have conspired to ensure our relative ignorance about the movements of Neotropical raptors. Studies to map their major migration routes and the wintering ranges of migrants in South America are needed in order to identify and protect key areas for their conservation. You can assist raptor migration studies because basic field observations are still very important and much needed. Thus, ordinary birdwatchers can make a useful contribution to the study of raptor migration in South America. Taylor²⁹ suggested several points to record when observing raptors on migration, namely predominant flight direction, estimated altitude and horizontal distance of migrants, the number of observers and total period of observation. Prevailing weather conditions should be measured or estimated on an hourly basis. In addition, observers should note that even records of birds identified solely to genus are valuable. Raptor researchers will value any contribution, no matter how small, that you can make on this topic.

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