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Distribution and migration of Mississippi Kites in South America

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ABSTRACT. Mississippi Kites (*Ictinia mississippiensis*) are trans-equatorial, long-distance migrants that breed in North America and overwinter in South America. Information about their migration routes and winter distribution in the Neotropics is mostly anecdotal. By compiling records of Mississippi Kites in South America from the literature and previously unpublished observations (1904–2010), we identified 96 locality records (a location where a flock or individual was recorded) and 146 independent records of flocks (observations of flocks irrespective of year, location, or time of year). Our locality records included 38 (39%) during southbound migration (1 September–30 November), 18 (19%) during northbound migration (15 February–30 April), 38 (39%) during austral summer (1 December–14 February), and two (3%) during austral winter (1 May–31 August). Most Mississippi Kites (84, 88%) were observed between the 11°S and 32°S latitudinal band in central South America. Of our independent records of flocks, 133 (92%) were observed between 11°S and 32°S, 12 (7%) between 11°N and 10°S, and a lone vagrant (1%) between 33°S and 43°S. Our data suggest that Mississippi Kites are common and widespread in the austral summer between 11°S and 32°S in central South America. On the basis of the number of locality records ($N = 52$, 54%) and number of flocks of Mississippi Kites observed between 22°S and 32°S ($N = 61$, 42%), the Chaco forest appears to be the main wintering grounds for the species. However, additional monitoring is needed to further test this hypothesis. A large portion of Chaco habitat is now under cultivation, and how this habitat transformation might influence the annual cycle of Mississippi Kites is unknown.

RESUMEN. **La distribución y migración de *Ictinia mississippiensis* en América del Sur**
Ictinia mississippiensis es una especie migrante trans-ecuatorial de larga distancia que se reproduce en América del Norte y pasa el invierno en América del Sur. La información disponible sobre sus rutas migratorias y su distribución durante el invierno en el Neotrópico es principalmente anecdótica. Al recopilar los registros de *I. mississippiensis* en América del Sur de la literatura y de observaciones inéditas (1904–2010), identificamos 96 registros de localidad (un lugar donde se registró una bandada o un individual) y 146 registros independientes de bandadas (observaciones de bandadas en cualquier año, ubicación o época del año). Nuestros registros de localidad incluyeron 38 (39%) durante la migración hacia el sur (1 de septiembre-30 de noviembre), 18 (19%) durante la migración hacia el norte (15 de febrero-30 de abril), 38 (39%) durante el verano austral (1 de diciembre-14 de febrero) y dos (3%) durante el invierno austral (1 de mayo-31 de agosto). La mayoría de los *I. mississippiensis* (84, 88%) fueron observados en la banda latitudinal de 11°S-32°S en el centro de América del Sur. De nuestros registros independientes de bandadas, 133 (92%) fueron observados entre 11°S-32°S, 12 (7%) entre 11°N-10°S, y uno solitario (1%) entre 33°S-43°S. Nuestros datos sugieren que los *I. mississippiensis* son frecuentes en el verano austral entre los 11°S-32°S en el centro de América del Sur. Basado en el número de registros de localidad ($N = 52$, 54%) y el número de bandadas de *I. mississippiensis* observados entre 22°S-32°S ($N = 61$, 42%), el bosque del Chaco parece ser el área de invernada principal para esta especie. Sin embargo, mas monitoreo es necesario para poner a prueba esta hipótesis. Una gran parte del hábitat del Chaco está ahora bajo cultivo. Cómo esta transformación del hábitat podría influir el ciclo anual de *I. mississippiensis* es desconocida.

Key words: Chaco forest, conservation, *Ictinia mississippiensis*, Neartic-Neotropical migrant, winter spatial segregation

Breeding areas are connected to wintering areas via the movement of individuals, and this connection is known as migratory connectivity (Webster and Marra 2005). Patterns of connections among specific summer and winter populations may have important consequences for the ecology and evolution of migratory birds (Webster and Marra 2005), and determining the areas used throughout the annual cycle is a significant challenge for the conservation of migratory birds (Webster et al. 2002).

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Mississippi Kites (*Ictinia mississippiensis*) are long-distance migrants that breed in North America and spend the boreal winter in South America (Ferguson-Lees and Christie 2001). These kites breed from the central and southern Great Plains east to the Atlantic Coast in the southern United States (Parker 1999, Wheeler 2003), whereas their wintering areas are virtually unknown across South America (Parker 1999). The Mississippi Kite population has been estimated at 190,000 individuals (BirdLife International 2012), but over 300,000 kites were counted on migration in southern Mexico in 2002 (Ruelas 2005).

The winter range of Mississippi Kites is imprecisely known. They were thought to winter only as far south as Guatemala (Parker 1977) until Blake (1949) documented the first records for the species in Paraguay, and Eisenmann (1963) reported the species in Argentina based on a study skin collected as early as 1904. Since then, these kites have been observed in Venezuela, Colombia, Ecuador, Peru, Brazil, and Bolivia (Hilty and Brown 1986, Ryan 2000, Clements and Shany 2001, Ridgely and Greenfield 2001, Olivo 2001, 2004, 2007, Schulenberg et al. 2007). No reports are available from French Guiana, Guyana, Suriname, Chile, and Uruguay (Ferguson-Lees and Christie 2001, Azpiroz 2003, Jaramillo 2003, A. Reinaudier and J. G. Leon, pers. comm.). Despite the growing number of reports, Mississippi Kites are considered scarce, rare, or transient in most countries where they have been reported in South America (Olrog 1979, Hilty and Brown 1986, Hayes 1995, Sick 1997, Clements and Shany 2001, Ridgely and Greenfield 2001, Guyra-Paraguay 2004, Schulenberg et al. 2007). In addition, the similarity of Mississippi Kites and the more common and widespread Plumbeous Kites (*Ictinia plumbea*) in tropical and subtropical forests has undoubtedly led to the former being overlooked in South America (Eisenmann 1963, Whittaker et al. 2008).

Nevertheless, observations by Ruelas (2005) suggest that >300,000 kites spend the winter in South America and determining where they overwinter in the Neotropics, both geographically and in terms of habitat, is a priority research question (Bildstein 2004). We provide new observations of Mississippi Kites in their wintering areas and compile available distributional data from the literature to provide an overview of their migration routes and wintering areas in South America.

METHODS

We assembled a database of records of Mississippi Kites from 1904 to 2010 in South America from literature sources, banding recoveries, museum specimens, migration counts, unpublished data from third parties (from Peru, eastern Bolivia, Paraguay, and northern Argentina), our own nonsystematic observations from the Dry Chaco region of Argentina from early December to mid-February 1999–2005, and data from a migration count at Concepción, Bolivia, conducted from mid-March to early April 2009 (for details see Table S1 and Juhant 2012). We obtained a total of 146 independent records of individuals or flocks (i.e., records of flocks or individuals even if observed at the same location during the same year and season [see definition of season below]) of Mississippi Kites in South America, including 84 (58%) from literature sources and 62 (42%) from previously unpublished observations. Independence of flocks observed in the same season and year in the same exact place was assessed based on behavioral patterns and flock size because we observed that flocks wintering in particular areas appeared with regularity from the same direction and at the same time of the day. When no such data were available from the literature, we assumed that reports of different flock sizes indicated that a different flock was being observed. For each independent flock record, we obtained the coordinates, date, number of kites, and source (Table S1). We grouped observations into four time periods or seasons based on migration counts in the Neotropics following Porras-Peñaranda et al. (2004), Ruelas (2005), Areta and Seipke (2006), Olivo (2004, 2007), and Juhant (2012): (1) southbound migration (1 September–30 November), (2) austral summer (1 December–14 February), (3) northbound migration (15 February–30 April), and (4) austral winter (1 May–31 August). We also grouped observations into five 10° latitudinal bands (11°N–01°N, 00°–10°S, 11°S–21°S, 22°S–32°S, and 33°S–43°S) to help clarify patterns in the timing of migration by Mississippi Kites. All observations were plotted on a map, with each point representing a locality record, that is, each unique location where a flock or individual

was observed in a given season (localities were counted more than once only if records occurred in different seasons) of Mississippi Kites in South America.

To obtain an overview of the number of locality records in each time period, we plotted the number of locality records per latitudinal band. We evaluated flock size frequency in the same latitudinal bands using data from all individual flock records. We categorized flock size into five categories (1–9, 10–99, 100–499, 500–999, and >1000 kites) and plotted their frequency per latitudinal band.

RESULTS

We obtained 96 locality records of Mississippi Kites in South America, including 38 (39%) during southbound migration, 18 (19%) during northbound migration, 38 (39%) during austral summer, and two (3%) during austral winter (Fig. 1, Table S1). Fifty-two (54%) locality records came from the Chaco forest, 29 (30%) from the neighboring semiopen habitats of Pantanal and Cerrado, and 15 (16%) were scattered across the continent.

Most locality records of Mississippi Kites (84, 88%) occurred between 11°S and 32°S in central South America, with few records (12, 11%) between 11°N and 10°S, and one record (1%) between 33°S and 43°S (Figs. 1 and 2). The 22°S–32°S band included most austral summer records (31, 81%), most northbound migration records (12, 67%), and all austral winter records (2, 100%), whereas the 11°S–21°S band included the most southbound migration records (25, 66%).

We obtained 146 independent flock records of Mississippi Kites in South America, with 133 (92%) between 11°S and 32°S, 12 (7%) between 11°N and 10°S, and a lone vagrant (~1%) between 33°S and 43°S (Figs. 1 and 3, Table S1). Solitary individuals or flocks consisting of ≤9 birds were encountered 58 times (40%; 21 wintering and 37 on migration), with the same number of flocks of 10–99 birds (40%; 22 wintering and 36 on migration). Flocks with 100–499 birds were observed 16 times (11%; 6 wintering and 10 on migration), those with 500–999 birds three times (2%; all on migration), and those with >1000 birds 11 times (8%; all on migration) (Figs. 1 and 3). Individuals or flocks consisting of ≤499 kites were observed between 11°N and 32°S, those with >500 individuals were recorded between 11°S and 32°S, 10 (91%) were observed at intermediate latitudes between 11°S and 21°S, and a single bird was observed between 33°S and 43°S.

More than a thousand Mississippi Kites have been observed during migration at only four locations, including three in eastern Bolivia (14°S–16°S) where large numbers of kites have been observed from October to November and March, and one in northern Argentina (25°S) where 10,000 kites were recorded in mid-February (Table S1). A minimum of ~2000 and a maximum of 16,400 kites have been recorded in Chaco habitats since 1904 (we do not know if the same birds were double-counted in different years), with the following flock sizes reported: 1–9 ($N = 26$), 10–99 ($N = 27$), 100–499 ($N = 7$), and >1000 ($N = 1$, see Areta and Seipke 2006).

DISCUSSION

Our data set of 96 locality records and 146 independent flocks suggests that Mississippi Kites are common and widespread in the austral summer between 11°S and 32°S in central South America (Figs. 1, 2, and 3). On the basis of the number of locality records (54%) and number of flocks of Mississippi Kites observed between 22°S and 32°S (42%), the Chaco forests appear to be the main wintering grounds of the species. Additional monitoring is needed to further test this hypothesis, but, given that the Chaco region is the subject of few surveys during the hot austral summer, we believe that our finding of many more records in this region than elsewhere is a conservative result (i.e., we have more likely underestimated than overestimated the numbers and localities of Mississippi Kites in the Chaco region).

Mississippi Kites enter South America through the Mesoamerican Land Corridor close to the onset of austral spring between September and October, and it was suggested based on scant data that they seem to travel rapidly east of the Andes foothills to the Amazonian lowlands (Stotz et al. 1992). South of Amazonia in the Bolivian lowlands at Concepción (16°S), an average of 132,080 kites were observed in two count-seasons from mid-September to late November (Olivo 2004, 2007). Concepción is

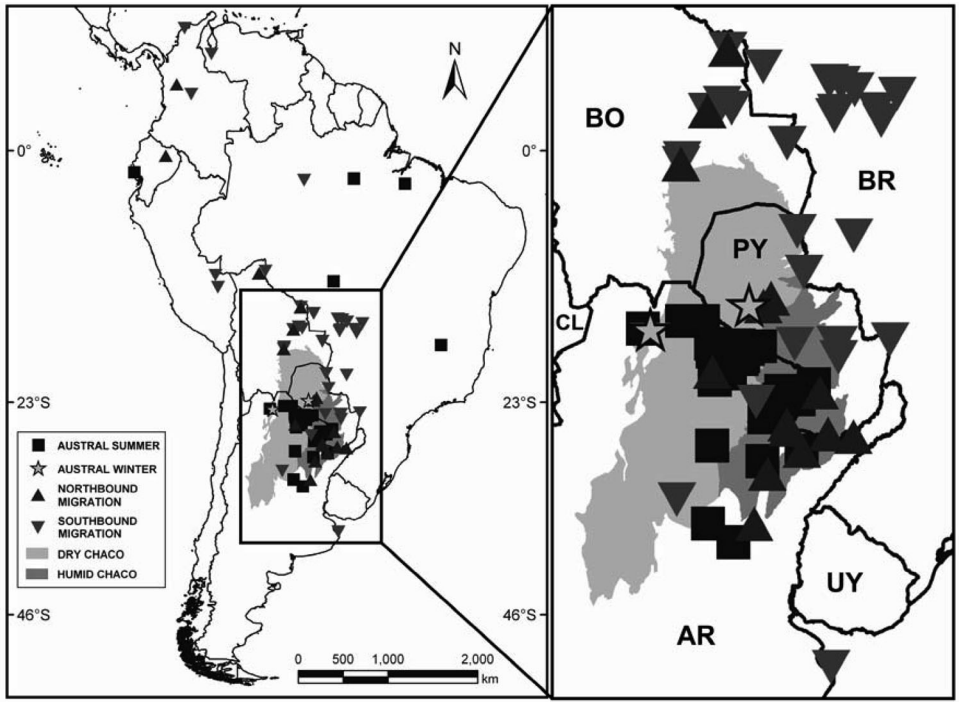

Fig. 1. Geographic distribution of records of Mississippi Kites (*Ictinia mississippiensis*) in South America (from data in Table S1). Argentina (AR), Bolivia (BO), Brazil (BR), Chile (CL), Paraguay (PY), and Uruguay (UY). The distribution of Dry and Humid Chaco is based on Olson and Dinerstein (2002).

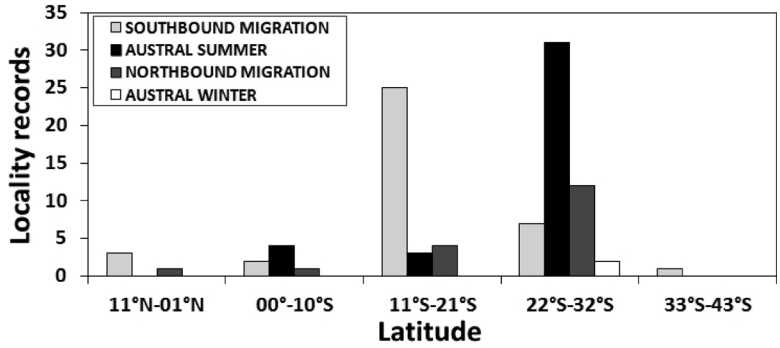

Fig. 2. Number of locality records of Mississippi Kites (*Ictinia mississippiensis*) in five 10° latitudinal bands in South America (from data in Table S1).

the only known site where significant numbers of Mississippi Kites converge in both seasons in South America and apparently represents their major flyway on the continent (Juhant 2011). Northbound migration begins in late austral summer between late February and early March from as far south as the Central Chaco in northern Argentina, where at Fuerte Esperanza (25°S) a flock of 10,000 was seen in mid-February (Areta and Seipke 2006). Further north, at Concepción (16°S), an average of 4700 kites where observed during two counts during March (Olivo 2007, Juhant 2012) and, over the Colombian Andes, at Fredonia (5°N) a single kite has been seen in five count-seasons between mid-March and mid-April (Colorado

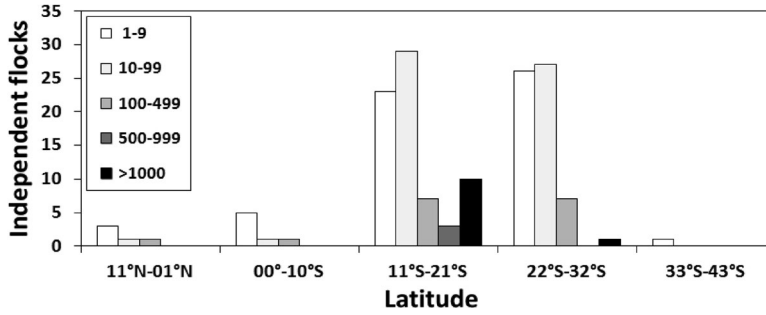

Fig. 3. Number of independent flock records of Mississippi Kites (*Ictinia mississippiensis*) in five 10° latitudinal bands in South America (from data in Table S1).

et al. 2006). The precise migratory routes of Mississippi Kites in South America are unknown; few northbound or southbound migration records connect Mesoamerica to wintering areas in South America (Fig. 1).

The supposed scarcity of Mississippi Kites in South America may have two non-mutually exclusive explanations. First, kites might be patchily distributed with higher densities in areas that are not the subject of ornithological surveys, such as the tropical areas between 10°N and 10°S and western Paraguay in the Dry Chaco region where large flocks may be frequent during migration (Fig. 1). Second, they might be widely distributed at low densities throughout the continent, an idea supported by the few records of small groups at tropical and subtropical latitudes (Fig. 1).

The single confirmed austral winter record of a Mississippi Kite in South America refers to an immature collected on 28 July 1965 in Yuto, Jujuy, Argentina (Table S1). Moreover, an unsubstantiated report placed Mississippi Kites in the category "monthly transient individual" (observation of one individual per month persisting in study area no more than 24 h) for May 1990 in Estancia Fortin Toledo, Boquerón, Paraguay (Table S1). These two exceptional records are expected, given the large number of kites overwintering within the 22°S–32°S latitudinal band. Long-distance migratory raptors are particularly prone to get lost or misoriented during migration, especially the youngest birds (Bildstein 2004). The southernmost record of Mississippi Kites belongs to an immature photographed as far south as the eastern Pampas at Punta Rasa, Argentina (Fig. 1, Table S1). Punta Rasa was considered a vagrant bird trap in which other migratory kites have been recorded as vagrants such as Plumbeous and Swallow-tailed Kites (*Elanoides forficatus*) (Jaramillo 2000, Juhant 2010).

Three Nearctic-Neotropical migrant raptors with migration routes and foraging behavior similar to those of Mississippi Kites overwinter in separate, but adjacent, habitats in the Southern Cone of South America. Mississippi Kites overwinter in southern Paraguay and northern Argentina mainly in Dry and Humid Chaco (this study), Swallow-tailed Kites overwinter in eastern Bolivia, western Brazil, and northern Paraguay down to 23°S mainly in forest and forest clearings (Meyer 2004, Zimmerman 2004), and Swainson's Hawks (*Buteo swainsoni*) overwinter in central Argentina mainly in the Pampas (Sarasola et al. 2008, Kochert et al. 2011). These three species with similar foraging behavior depend largely on the spatial and temporal occurrence of food (insects), suggesting that their essentially parapatric wintering distributions may result in avoidance of direct resource competition (Bull 1991, Brindle and Vines 2007).

Chaco habitats have been severely deforested and replaced primarily by dry-land crops such as soybeans (Houghton et al. 1991, Boletta et al. 2006, Gasparri and Grau 2009) and, as a result, conservation of the large area encompassing southern dry tropical forests—where most observations of Mississippi Kite have been reported in South America—has been considered a priority (Beissinger et al. 1996). The quality of winter habitat has been shown to affect the timing of spring migration and physical conditions at

departure in birds, which in turn influences their arrival dates and physical condition on the breeding grounds (Webster and Marra 2005). A large portion of native habitat is now under cultivation in the wintering area of Mississippi Kites, and how this habitat transformation might influence their annual cycle remains to be determined. Habitat loss and fragmentation in their breeding range have been considered the main cause of the decline of Mississippi Kite populations (Bader and Bednarz 2009), and may be equally important factors in their wintering range. Systematic surveys such as migration count and road surveys in austral summer are needed to better delineate the wintering areas of Mississippi Kites in South America. Once the relative importance of particular areas is established, then efforts should be made to help ensure the conservation of those areas.

ACKNOWLEDGMENTS

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web site:

Table S1. Records of Mississippi Kites (*Ictinia mississippiensis*) in South America. Each record is grouped by country, locality with its coordinates, date, number of kites, and source. Observers: Juan I. Areta (JIA), Igor Berkunsky (IB), Hernan Casañas (HC), Mariano Codesido (MC), Pablo Grili (PG), Michael Hunter (MH), Flavio Moschione (FM), Tito Narosky (TN), Luis Pagano (LP), Mark Pearman (MP), Hernan Povedano (HP), German Pugnali (GP), D. Ricalde (DR), Ignacio Roesler (IR), Paul Smith (PS), J. Quillen Vidoz (JQV), and Barry Walker (BW).

Supplementary Table S1. Records of Mississippi Kites (*Ictinia mississippiensis*) in South America. Each record is grouped by country, locality with its coordinates, date, number of kites, and source. Observers: Juan I. Areta (JIA), Igor Berkunsky (IB), Hernan Casañas (HC), Mariano Codesido (MC), Pablo Grili (PG), Michael Hunter (MH), Flavio Moschione (FM), Tito Narosky (TN), Luis Pagano (LP), Mark Pearman (MP), Hernan Povedano (HP), German Pugnali (GP), D. Ricalde (DR), Ignacio Roesler (IR), Paul Smith (PS), J. Quillen Vidoz (JQV), and Barry Walker (BW).

Southbound migration (1 September-30 November): Venezuela, N of El Vigía (8°37'N, 71°39'W), 12 Sep 1999, 1 (Ryan 2000). **Colombia**, NW of Bogotá (5°09'N, 74°09'W), 17 Oct 1972, 30 and a collected kite FMNH-13628 (Torres 1975); Barranquilla (10º57'N, 74º47'W), Nov, *c.* 200 (Meyer de Schauensee and Phelps 1978). **Peru**, Cocha Cashu Biological Station (11º10'S, 71º10'W), 16 Nov 1982, 100-150 (Terborgh et al. 1984); Alto Madre de Dios (12º17'S, 70º53'W), 10 Nov 2003, 1 (BW). **Bolivia**, Estación Biológica Caparú (14°48'S, 61°10'W), 4 Oct 2005, 15; 5 Oct 2005, 20; 10 Oct 2005, 4; 18 Oct 2005, 2000 (JQV, see also Vidoz et al. 2010); Santa Rosa de la Roca-San Javier (15º54'S, 61º24'W), mid Oct 1999, *c.* 200 (MH); N of Santa Rosa de la Roca, 8 Nov 1999, 2000 (DR); San Miguel de Velasco (16º04'S, 61ºW), 11 Nov 1986, a band recovered (Shaw and Maxwell 1988); Concepción (16º08'S, 62º02'W), 15 Sep-15 Nov 1985, flocks 13-15; 31 Sep-25 Nov 1986, flocks 13-15; 25-31 Oct 1987, 300-500 and collected kites on 22 and 25 Nov 1986-87, FMNH-334914/334915/334916/334917 (Davis 1989); Concepción, 22-28 Nov 2000, 37 807 (Olivo 2001); Concepción, 17-30 Sep 2001, 6637; 1-31 Oct 2001, 70 697; 1-26 Nov 2001, 40 819 (Olivo 2004); Concepción, 28-30 Sep 2003, 636; 16-31 Oct 2003, 73 666; 1-25 Nov 2003, 71

688 (Olivo 2007); Lomas de Arena (17°56’S, 63°10’W), Oct 2006, 1 (JIA and LP); San Ignacio de Velasco (17°15’S, 58°38’W), 27 Oct 2005, 5 (JQV, see also Vidoz et al. 2010); San Fernando de Pozones (17°15’S, 58°38’W), 12 Oct 2008, 30 (JQV, see also Vidoz et al. 2010); Jardin Botanico de Santa Cruz (17°46’S, 63°08’W), 10-16 Nov 2000, 2 (Olivo 2001). **Brazil**, Anavilhanas Archipelago (2°40’S, 60°47’W), 21 Nov 1985, 1 (Stotz et al. 1992); Guajará Mirim (10°47’S, 65°19’W), 28 Sep 2003, >100 (Whittaker et al. 2008); Serra de Vicente (14°40’S, 59°40’W), 23 Oct 2003, >25 (Whittaker et al. 2008); Serra das Araras (15°10’S, 56°51’W), 13 Oct 2000, >20; 2 Oct 2002, 80; 8-10 Oct 2002, 20-30 (Whittaker et al. 2008); Nossa Senhora de Livramento (15°14’S, 56°20’W), 2 and 18 Nov 2000, >80 and >60; 12 and 16 Oct 2000, >50 and >40; 10 Oct 2003, >40 (Whittaker et al. 2008); Chapada dos Guimarães (15°26’S, 55°46’W), 14 Oct 1999, 63 (Mazar Barnett and Kirwan 2000b); Chapada dos Guimarães, 14 Nov 1996, 82; 7 Oct 2000, >20; 15 Sep 2001, 4; 14-16 Oct 2006, >20 (Whittaker et al. 2008); Pedra Preta (15°35’S, 53°57’W), 24 Oct 2005, 15-20 (Whittaker et al. 2008); S of Poconé (16°19’S, 56°38’W), 17 Oct 1997, 200 (Mazar Barnett and Kirwan 2000a); Poconé, 12 Oct 1999, 20 (Whittaker et al. 2008); Poconé-Río Pixaim (16°19’S, 56°38’W), 12 Oct 1999, *c.* 20 (Mazar Barnett and Kirwan 2000b); E of Cuiabá (16°07’S, 54°51’W), 24 Oct 2005, 120 (Whittaker et al. 2008); Rondonópolis (16°28’S, 54°38’W), 27 Oct 2003, 10; 24 Oct 2005, 40-50 (Whittaker et al. 2008); N of Pantanal (16°10’S, 56°34’W), Oct 2001, 1 (Whittaker et al. 2008); Fazenda Nhumirim (18º59´S, 56º39´W), Nov 2006, >500 (Nunes et al. 2008); N of Aquidauana (20°25’S, 55°48’W), 17 Oct 2003, 67 (Whittaker et al. 2008). **Paraguay**, Madrejón (20°38'S, 59°52'W), late Oct 1995, 2 (Zyskowski et al. 2003); Bahia Negra (20°15’S, 58°12’W), 28 Oct 1988, 3 (Hayes et al. 1990); Puerto María Auxiliadora (21°41’S, 57°55’W), 27 Oct 1988, 3 (Hayes et al. 1990); Chore (24°10’S, 56°35’W), 1 Oct 1987, 5 (Hayes et al. 1990); Río Negro (24°12’S,

58°19’W), 16 Oct 1987, 1 (Hayes et al. 1990); E of Santa Elena (24°02’S, 54°16’W), 13 Nov 2003, *c.*75 (Whittaker et al. 2008); Lima-Guayaibí (24°10’S, 56°27’W), 15 Nov 2003, >125 (Whittaker et al. 2008); San Estanislao (24°40’S, 56°27’W), 18 Oct 2008, 10 (PS). **Argentina**, Parque Provincial Pampa del Indio (26°16’S, 59°58’W), 17 Nov 1998, 2 (Bodrati 2005); Villa Candelaria (29°50’S, 63°20’W), 4 Nov 1987, 1 (Torres et al. 2006); Punta Rasa (36°17’S, 58°46’W), 18 Nov 2008, 1 (Juhant 2010).

Austral summer (1 December - 14 February): Ecuador, Loma Alta (1°56’S, 80°37’W) 31 Dec 2005, 4 (Kirwan et al. 2006). **Brazil**, Alter do Chão (2°31’S, 54°56’W), 4 Dec 2005, 19 (Whittaker et al. 2008); Agropalma (2°31’S, 48°45’W), 12 Jan 2006, 1 (Olmos et al. 2006); Tailândia (2°57’S, 48°57’W), 12 Jan 2006, 1 (Whittaker et al. 2008); S of Transpantaneira (11°44’S, 57°19’W), 15 and 23 Jan 2005, 3 and 5 (Whittaker et al. 2008); Várzea de Palma (17°35’S, 44°43’W), 10 Jan 2003, 3 (Kirwan et al. 2004); Fazenda Figueirinha (19°4'S, 57°12'W), 17 Jan 2006, *c*. 250 (Vasconcelos et al. 2008). **Paraguay**, Chaco Central, Jan-Mar, 8, this datum was not included on the map due to lack of information (Whittaker et al. 2008). **Argentina**, El Cantor (23°23’S, 62°13’W), 4 Jan 2003, 90 (JIA); Pluma del Pato (23°22’S, 63°06’W), 31 Dec 2003, 15-20 (FM); Parque Nacional Calilegua (23°39’S, 64°47’W), 15 Jan 1988, 5 (FM); El Simbolar (24°16’S, 61°08’W), 7-12 Dec 1999, 30 (JIA); Posta Sargento Cabral (24°22’S, 60°19’W), 12 Jan.1991, 26 (FM); Reserva Natural Formosa (24°27’S, 61°48’W), 7 and 8 Dec 1994, 2 and 5 (FM); Las Lomitas (24°42’S, 60°36’W), 15 Jan 1995, 1 (MC); Las Lomitas (24°42’S, 60°36’W), Jan 2000, 30-40 (PG); Lomitas-Teuco (24°42’S, 60°36’W), 6 Dec 1993, >50; 6 Jan 1995, 290 (FM); Bazán-Las Lomitas (24°42’S, 60°36’W), 29 Dec 2001, 200, (MC); La Línea (24°14’S, 60°41’W), 8 Dec 1998, 15-25; 14 Dec 1999, 40 (JIA); El 14 (24°37’S, 60°31’W), 29 Dec 2000, 50 (JIA); Campo Bandera (24°10’S, 61°53’W), 18 and 23 Dec 2003,

200 and 20 (MC); Colonia Muñiz (24°43’S, 60°34’W), 8 Jan 2000, >100 (IB); Bañado La Estrella (24°16’S, 59°47’W), 11 Jan 1992, 10 (FM); Las Lomitas-Campo del Cielo (24°10’S, 61°53’W), 14 Dec 1997, 20 (FM); Nueva Pompeya-Las Hacheras (25°15’S, 61°05’W), 14 Jan 2001, >50 (IB); Reserva Loro Hablador (25°27’S, 61°43’W), 11 Jan 1999, 45 (HP); Reserva Loro Hablador, 12 Dec 1999, 17 (HP); Reserva Loro Hablador, 12 Jan 1999, 13, (Bodrati 2005); Colonia Nueva Italia (25°37’S, 57°30’W), 14 Dec 1944, a collected kite CNHM-152816 (Blake 1949); La Alegría-Gran Guardia (25°51’S, 58°46’W), 26 Jan 2002, 2 (MP, GP, and HC); Gran Guardia (25°51’S, 58°50’W), 30 Dec 2000, 3 (FM); La Alegría (25°51’S, 58°39’W), 26 Jan 2002, 15 (MP, GP and HC); Parque Nacional Chaco (26°48’S, 59°36’W), Nov, Feb, Mar 1997, 2; Nov-Jan 1998, 2; Dec 1999, 2 (Bodrati 2005); Reserva El Bagual (26°10’S, 58°56’W), Jan-Feb, flocks 25-30 (Di Giacomo 2005); N of Manuel Belgrano (26°10’S, 58°09’W), 5 Dec 1993, 7 (FM); Azurduy (26°11’S, 58°58’W), 23 Dec 2003, 20-30; 10 Jan 2004, 20-30 (IB); Campo del Cielo (27°50’S, 61°49’W), 11 Jan 1992, 25; 7 Jan 1995, 50 (FM); Mocovi (28°25’S, 59°41’W), 6 Jan 1904, 1 (Eisenmann 1963); Estancia Santa Teresa (28°01’S, 58°01’W), Jan-Mar, 30-250 (Zalles and Bildstein 2000); N of Morteros (30°43’, 62°W), 26 Jan 1983, 1 (Torres et al. 2006); Reserva Natural de la Escuela de Granja (31°26’S, 60°55’W), 6 Jan 2010, 15 (Alvarado et al. 2010).

Northbound migration (15 February - 30 April): Colombia, Fredonia (5°54’N, 75°43’W), 15 Mar-15 Apr 2000, 1 (Colorado et al. 2006). **Ecuador**, W of Napo (0°26’S, 77°W), Apr, 3 (Ridgely and Greenfield 2001). **Bolivia**, Riberalta (11°00’S, 66°00’W), 3 Apr 1994, 25 (Zalles and Bildtein 2000); Estación Biológica Caparú (14°48’S, 61°10’W), 11, 17, 19, 26 and 31 Mar 2006, 20, 600, 3, 3, 1; 1 Apr 2006, 300; 9 Mar 2007, 1 (JQV, see also Vidoz et al. 2010); Concepción (16°08’S, 62°02’W), 6-30 Mar 2003, 3846 (Olivo, 2007); Concepción, 10-31 Mar

2009, 5571 (Juhant 2012); Lomas de Arena (17°56’S, 63°10’W), 2 and 13 Mar 2009, 1 and 33 (JQV, see also Vidoz et al. 2010). **Paraguay**, Paraguay, Lichtenau (22°49’S, 59°39’W), 19 Feb 1967, a collected kite AMNH-803139 (Short 1975); Reserva Natural Privada Campo Maria (22°34’S, 59°20’W), Feb-Mar 2001, 8 (Bodrati 2005); Colonia Nueva Italia (25°37’S, 57°30’W), 26 Feb 1942, a collected kite CNHM-102966 (Blake 1949); Cerro Acahay (25°50’S, 57°15’W), 24 Mar 1988, 5 (Hayes et al. 1990); Ayolas (27°24’S, 56°54’W), 11 Mar 1989, 14 (Hayes et al. 1990). **Argentina**, Fuerte Esperanza (25°09’S, 61°50’W), 20 Feb 2002, 10 000 (Areta and Seipke 2006); E of Garupa (27°29’S, 55°49’W), 1 Feb 1989, 3 (Heinonen- Fortabat and Chebez 1989); Las Palmas (27°03’S, 58°40’W), 1 Mar 1988, 170 (FM); Isla del Cerrito (27°14’S, 58°40’W), 29 Feb 1988, 500 (FM); Parque Nacional Mburucuyá (28°S, 58°01’W), 27 Mar 2005, 21 (IR); Arroyo Las Garzas (28°51’S, 59°30’W), 18 Feb 1974, 4 (TN); Villa del Totoral (30°42’S, 60°03’W), 19 Feb 1977, 2 (Nores and Yzurieta 1979).

Austral winter (1 May - 31 August): Paraguay, Estancia Fortín Toledo (22°33’S,60°30’W), May 1990, 1 (Brooks 1997). **Argentina**, Yuto (23°38’S, 64°28’W), 28 Jul 1965, specimen COFML-14018 (Olrog 1967, Nores 1986).

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