

NORTH AMERICAN BIRD MIGRANTS IN PARAGUAY¹

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Abstract. The status of North American bird migrants in Paraguay is reviewed and summarized. Observations (from 1987-1989) are reported for 29 of the 32 species documented from Paraguay. New extreme migration dates, maximum counts, and distributional records are reported for many species, including six species of North American migrants documented from Paraguay for the first time: Peregrine Falcon (*Falco peregrinus*), Black-bellied Plover (*Pluvialis squatarola*), Red Knot (*Calidris canutus*), Sanderling (*C. alba*), Arctic Tern (*Sterna paradisaea*), and Purple Martin (*Progne subis*). Paraguay's Nearctic migrant fauna is dominated by aquatic nonpasserines, especially shorebirds; terrestrial nonpasserines and passerines are poorly represented. Paraguay's fauna is depauperate compared with other Neotropical areas to the north, presumably due to its southern and inland location. Most migrant species feed primarily on invertebrates. More species inhabit wetlands than dry areas.

Key words: Bird migration; distribution; food use; habitat use; North America; Paraguay; seasonality.

Resumen. Se resume el estado de las aves migrantes norteamericanas en el Paraguay. Se informa en relación a las observaciones (desde 1987 hasta 1989) para 29 de las 32 especies documentadas para el Paraguay. Se presentan datos referentes a nuevas fechas extremas de migración, censos máximos y registros distribucionales para muchas especies, incluyendo seis especies de migrantes norteamericanas documentadas para el Paraguay por primera vez: el Halcón Peregrino (*Falco peregrinus*), Chorlo Ártico (*Pluvialis squatarola*), Playero Rojizo (*Calidris canutus*), Playerito Blanco (*C. alba*), Gaviotín Ártico (*Sterna paradisaea*) y Golondrina Purpúrea (*Progne subis*). La fauna migrante neártica del Paraguay está dominada por las aves acuáticas no-paserinas, especialmente los playeros; las aves terrestres no-paserinas y las paserinas están pobremente representadas. La fauna paraguaya es pequeña en comparación con otras áreas neotropicales más al norte, presumiblemente debido a su ubicación meridional y lejos del mar. La mayoría de las especies migratorias se alimentan principalmente de invertebrados. Se encuentran más especies en humedales que en áreas secas.

INTRODUCTION

Although more than half of the Nearctic breeding bird species spend at least part of their lives as migrants in Neotropical areas (Rappole et al. 1983), much remains to be learned of their distribution, abundance, and seasonality in many areas of the Neotropics. In the Republic of Paraguay, where previous ornithological research focused primarily on the distribution and taxonomy of local breeding species, a paucity of

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published information exists on the occurrence of North American migrants. In this paper we report our observations, from 1987–1989, of 29 species of North American bird migrants in Paraguay, and review the status of all species reported from the country. New extreme migration dates, maximum counts, and distributional records are reported for many species, including six species documented from Paraguay for the first time. We also compare the migrant fauna of Paraguay with several other Neotropical areas and discuss food and habitat use of migrants.

ECOLOGICAL ZONES AND CLIMATE

Situated in the interior of south-central South America, the land-locked Republic of Paraguay comprises an area of 406,752 km². The country is divided by the southward-flowing Paraguay River into two distinctive regions (Fig. 1). To the west, the Chaco region is essentially a vast, relatively flat alluvial plain gradually sloping downward toward the Paraguay River from the Andean foothills. The northwestern portion of the Chaco is arid and characterized by xerophytic vegetation. Further east, toward the Paraguay River, the scrub forests gradually become taller and more scattered as the terrain becomes dominated by seasonally inundated palm savannas. The northeastern corner of the Paraguayan Chaco is more heavily forested than the lower Chaco and is ecologically similar to the Pantanal of adjacent Bolivia and Brazil.

East of the Paraguay River, the more topographically diverse Oriental region comprises a mosaic of habitats. Xerophytic Chaco formations persist along the east bank of the river in some areas, gradually yielding to taller and more humid deciduous forests to the east. The northeastern corner of the Oriental region is dominated by a peculiar scrub forest formation referred to as *campos cerrados*. The upper Paraná River basin of the southeastern part of the Oriental region was once dominated by tall humid forests, but as in many areas of the region, much of the forest has been cleared during the last few decades by developing agricultural communities. Toward the confluence of the Paraná and Paraguay Rivers, in the southwestern corner of the Oriental region, the terrain is characterized by extensive prairies and wetlands dotted by scattered patches of scrub forests, and is ecologically similar to the eastern Chaco. The topography of the Oriental region is punctuated in many areas

by undulating or precipitous hills, none exceeding 800 m in elevation.

Precipitation in Paraguay is lowest in the western Chaco, averaging less than 500 mm annually in some areas, and highest in southeastern Paraguay where an average of over 1,700 mm of rain falls annually. The distribution of precipitation is highly seasonal in the Chaco, where rain seldom falls during the dry season, from June to October, yet causes extensive flooding during the wet season, from November to May. The same seasonal pattern holds true for the Oriental region, although rainfall is more evenly distributed during the year and more frequent than in the Chaco. Temperatures in Paraguay often exceed 40°C during the austral summer, and occasionally dip below freezing during winter, thus subjecting large portions of the country to occasional frost. Mean annual temperatures range from less than 21°C in southeastern Paraguay to over 25°C in the northeastern Chaco.

SPECIES ACCOUNTS

In the following accounts, species enclosed by brackets are presently regarded as hypothetical in Paraguay. Figure 1 shows the location of each of the 19 departments (Dept.) of Paraguay; departments are identified only at the first mention of a specific locality. Geographical coordinates are given for localities not listed in Paynter (1989). Seasonal references pertain to the boreal cycle because North American bird migrants *winter* in the southern hemisphere even though locally it is summer. "Migrant" refers to birds passing through during fall and spring; "visitor" refers to birds remaining during winter or summer. Abundance terms are defined as follows: common, observed daily in appropriate habitat; fairly common, observed every other day on average; uncommon, observed once every 2–10 days; rare, observed at intervals of 10 or more days. Nomenclature and sequence of species follow the AOU (1983).

Acronyms in addition to the authors' initials include: AFARP = Archivo Fotográfico de Aves Raras del Paraguay, San Lorenzo; FMNH = Field Museum of Natural History, Chicago; IML = Instituto Miguel Lillo, Tucumán, Argentina; MAS = Museo A. Schulz, Resistencia, Argentina; MNHNP = Museo Nacional de Historia Natural del Paraguay, San Lorenzo; MVZ = Museum of Vertebrate Zoology, University of California, Berkeley; UMMZ = University of Michigan Mu-

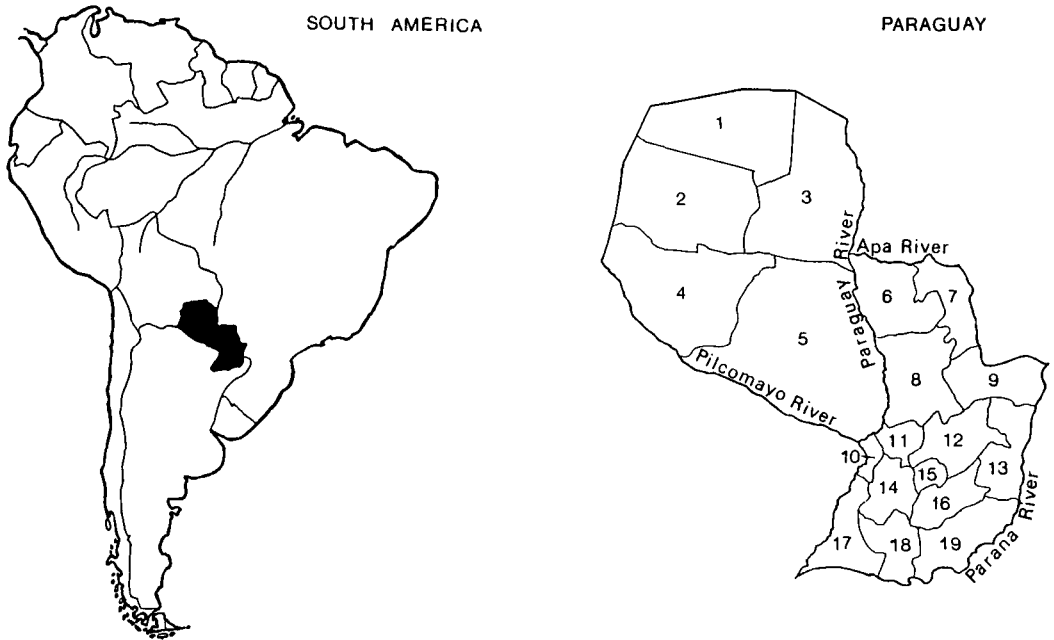


FIGURE 1. Map of Paraguay showing location of 19 departments and major rivers. Departments: 1 = Chaco; 2 = Nueva Asunción; 3 = Alto Paraguay; 4 = Boquerón; 5 = Presidente Hayes; 6 = Concepción; 7 = Amambay; 8 = San Pedro; 9 = Canindeyú; 10 = Central; 11 = Cordillera; 12 = Caaguazú; 13 = Alto Paraná; 14 = Paraguari; 15 = Guairá; 16 = Caazapá; 17 = Ñeembucú; 18 = Misiones; 19 = Itapúa.

seum of Zoology, Ann Arbor; and VIREO = Visual Resources for Ornithology, Philadelphia, Pennsylvania.

OSPREY (*PANDION HALIAETUS*)

In Paraguay, this species has been recorded only a few times along the Paraguay River at Lambaré and Asunción, Dept. Central (Berlepsch 1887, Bertoni 1914), and at Río Negro, Dept. Presidente Hayes (Bent 1937). A specimen in UMMZ was collected 40 km WSW of Capitán Bado, Dept. Amambay, on 15 November 1938. At Bahía de Asunción, we observed this species during eight of 37 visits between the dates of 20 October and 29 March. Shipboard censuses conducted by FEH along the Paraguay River between Asunción and Bahía Negra, Dept. Alto Paraguay (853 km of river), revealed linear densities of 0.07 birds/10 km from 14–17 June 1988 (138.2 km surveyed), 0 birds/10 km from 9–11 August 1988 (159.8 km), 1.13 birds/10 km from 25–28 October 1988 (195.0 km), and 0.86 birds/10 km from 24–27 January 1989 (185.6 km). During these censuses Ospreys were noted at least once in each dept. bordering the river (Fig. 1). Noteworthy summer

records include single birds seen by FEH along the Tebicuary River at Villa Florida, border of Depts. Paraguari and Misiones (26°25'S, 57°05'W), on 12 June 1988, and along the Paraguay River near Puerto María, Dept. Alto Paraguay, on 16 June 1988. SMG noted a single bird 16 km N of Antequera, Dept. San Pedro, on 15 September 1988. A Madroño (pers. comm.) observed four Ospreys on 22, 24, and 26 August 1989 along the Paraguay River north of Concepción. The Osprey appears to be a common migrant and winter visitor and rare summer visitor of the larger rivers in Paraguay.

MISSISSIPPI KITE (*ICTINIA MISSISSIPPIENSIS*)

Specimens have been collected at (Colonia) Nueva Italia, Dept. Central (Blake 1949; undated specimen in MAS), and at Lichtenau, Dept. Presidente Hayes (Short 1976), between the dates of 14 December and 26 February. Sightings by FEH include five birds at Choré, Dept. San Pedro (24°10'S, 56°35'W), on 1 October 1987 (listed by Hayes and A. de Medina 1988); one with three Plumbeous Kites (*I. plumbea*) along the Ruta

Trans Chaco at Río Negro, Dept. Presidente Hayes (24°12'S, 58°19'W), on 16 October 1987; five at Cerro Acahay, Dept. Paraguari (25°53'S, 57°15'W), on 24 March 1988; three at Puerto María Auxiliadora, Dept. Alto Paraguay (21°43'S, 57°55'W), on 27 October 1988; three at Bahía Negra on 28 October 1988; and 14 at Ayolas, Dept. Misiones, on 11 March 1989. This species appears to be an uncommon migrant and rare winter visitor in Paraguay.

SWAINSON'S HAWK (*BUTEO SWAINSONI*)

Steinbacher (1962) reported a male collected at Orloff, Dept. Boquerón, on 13 December 1955. On 3 December 1987, TGT observed a light-phased adult perched on a post in a marsh 40 km SE of Bella Vista, Dept. Amambay (22°17'S, 56°21'W). On 25 February 1989, FEH noted a light-phased bird (adult?) soaring over fields at Parque Nacional Ybycui, Dept. Paraguari (26°07'S, 56°49'W). This species appears to be a rare winter visitor in Paraguay.

PEREGRINE FALCON (*FALCO PEREGRINUS*)

Bertoni (1914) reported a juvenile specimen from Puerto Bertoni, Dept. Alto Paraná; the Bertoni collection apparently has been lost. Steinbacher (1962) and Storer (1989) reported five specimens of Peregrine Falcons from the central Paraguayan Chaco, Depts. Boquerón and Presidente Hayes, between the dates of 27 December and 1 June. Four of these specimens were identified as the Neotropical race *F. p. cassini*; the fifth specimen was unavailable for examination. In late November or early December 1987, an adult Peregrine Falcon was found dead in Asunción (USFWS band 576-87545; photographs in Anonymous 1987). The bird was banded by J. Weaver on 13 October 1979, as a male less than one year old, at Loggerhead Key, Dry Tortugas, Florida (G. M. Jonkel, pers. comm.). The subspecific status and whereabouts of the specimen are unknown. This is the only documented occurrence of a North American Peregrine Falcon in Paraguay. Along the Paraguay River, FEH observed single Peregrine Falcons flying over Bahía de Asunción on 20 October 1987 (adult), 16 December 1987, and 5 and 23 January 1989 (adult); perched below the bridge at Puente Remanso, border of Depts. Presidente Hayes and Central (25°11'S, 57°31'W), on 17 March (observed capturing a Wattled Jacana [*Jacana jacana*] in flight)

and 25 March 1988 (adult), 30 October 1988, 17 December 1988 (adult), and 21 October 1989; on cliffs at Puerto Valle Mí, Dept. Concepción, on 29 October 1988 (adult); flying along both sides of the river 1 km S of Concepción, Dept. Concepción, on 25 January 1989 (immature); and perched on a large communications tower at Bahía Negra, seen daily between 27 January and 7 February 1989 (adult). On 18 September 1988, SMG noted an immature flying along the Paraguay River 10 km N of Puerto Max, Dept. Concepción. On 30 October 1989, FEH and TGT saw an adult female perched on a tall building in downtown Asunción. The origin of the Paraguayan River birds is uncertain. The timing of these sightings suggests that the birds may have been migrating or wintering birds of North American origin; none was seen along the river during ship surveys in June and August 1988. Peregrine Falcons of North American origin may be uncommon migrants and winter visitors in Paraguay. The falcons apparently benefit from the installation of high man-made structures, often utilized as perches and roosts, along the Paraguay River.

BLACK-BELLIED PLOVER (*PLUVIALIS SQUATAROLA*)

This species is a rare migrant in the interior of South America, where it has been recorded at Córdoba, Argentina (Nores and Yzurieta 1979), the Napo River region of Ecuador and the Mato Grosso region of Brazil (Meyer de Schauensee and Mack 1982), and at Santa Cruz, Bolivia (Schmitt et al. 1986). At Bahía de Asunción, FEH photographed single birds on 11 December 1987 (AFARP, VIREO x08/6/002) and on 2 December 1988 (AFARP, VIREO x08/6/003); identifications were confirmed by M. Robbins. Both birds were foraging with Lesser Golden-Plovers (*Pluvialis dominica*). A third individual was observed at Bahía de Asunción by FEH and F. A. de Medina on 5 January 1989 as it foraged with Southern Lapwings (*Vanellus chilensis*) and Pectoral Sandpipers (*Calidris melanotos*). The Black-bellied Plovers were in nonbreeding plumage, and were observed both at rest and in flight. These birds probably represent southward-bound migrants. These are the first records of this species in Paraguay, where it appears to be a rare but regular migrant, passing through rather late in the season.

LESSER GOLDEN-PLOVER
(*PLUVIALIS DOMINICA*)

In Paraguay, this species has been recorded from Depts. Boquerón (Steinbacher 1968) and Presidente Hayes (Bertoni 1930, Wetmore 1926, Steinbacher 1962, 1968; specimens in FMNH), and southeastern Paraguay (Bertoni 1914), between 6 September (Wetmore 1926) and 19 November (Steinbacher 1968). The UMMZ has three specimens from 170 km W of Puerto Casado, Dept. Boquerón or Alto Paraguay, two from 120 km W of Puerto Pinasco, Dept. Presidente Hayes, and a male collected on 20 November 1938 from 40 km WSW of Capitán Bado. At Bahía de Asunción, FEH and JAF regularly observed this species between 22 October and 16 December, with a maximum of 100 birds on 17 November 1988; later records include single birds on 8 March 1988 and 11 January 1989, and three birds on 17 January 1989. SMG collected three birds (UMMZ) from a flock of 30 on 21 September 1988 at Colonia Carmelo Peralta, Dept. Alto Paraguay. On 31 August 1989, NEL and R. Behrstock observed six birds at Concepción. FEH has observed small numbers on several occasions in the central Chaco; in September most of the birds retained traces of their breeding plumage, whereas birds observed later were in nonbreeding plumage. This species appears to be a fairly common fall migrant in Paraguay through mid-December, and a rare winter visitor and spring migrant. Its primary winter range appears to be further south in Argentina (Myers and Myers 1979).

[SEMIPALMATED PLOVER
(*CHARADRIUS SEMIPALMATUS*)]

Myers and Myers (1979) observed three individuals 320 km "west" (undoubtedly northwest, in Dept. Presidente Hayes) of Asunción, on 5 September 1973. Because no description of the birds was given, we consider this sight record hypothetical.

GREATER YELLOWLEGS
(*TRINGA MELANOLEUCA*)

This species has been recorded from Depts. Boquerón (Steinbacher 1962; specimen in MVZ) and Presidente Hayes (Wetmore 1926, Steinbacher 1968), from late August (Myers and Myers 1979) until 23 November (Steinbacher 1962). The UMMZ has six specimens from Capitán

Bado and 40 km SW, taken as early as 31 August, and one from Rosario, Dept. San Pedro. At Bahía de Asunción, Greater Yellowlegs were usually present between 20 October and 23 January, with a maximum of eight birds on 10 November and 2 December 1988. FEH noted two birds near Carayaó, Dept. Caaguazú, on 14 September 1989, and one bird 5 km N of Curuguaty, Dept. Canindeyú, on 16 September 1989. During spring migration, FEH observed one bird at Laguna Capitán, Dept. Presidente Hayes, on 1 April 1988; one bird on the Tebicuary River N of Villa Florida, in Dept. Paraguari, on 15 and 16 April 1988; nine birds 10 km W of San Cosme y Damián, Dept. Itapúa (27°19'S, 56°25'W), on 23 March 1989; and two birds at Yabebyry, Dept. Misiones (27°23'S, 57°08'W), on 25 March 1989. The Greater Yellowlegs appears to be a fairly common fall migrant and an uncommon winter visitor and spring migrant.

LESSER YELLOWLEGS
(*TRINGA FLAVIPES*)

In Paraguay, this species has been recorded from Depts. Alto Paraguay (López 1985; specimens in MNHNP and UMMZ), Boquerón (Steinbacher 1962), Presidente Hayes (Wetmore 1926, Steinbacher 1962, Peris and Suárez 1985, Peris et al. 1987; specimens in UMMZ), Concepción (Laubmann 1939) and Central (Grant 1911), between 8 August and 7 May (Steinbacher 1962, 1968). The UMMZ has eight specimens from Capitán Bado and one from 20 km E of Rosario. We have observed Lesser Yellowlegs at several localities in the Chaco, with maximum counts (by FEH) of 266 birds at Laguna Capitán on 1 April 1988, and 140 at Bahía Negra on 18 August 1988. At Bahía de Asunción, Lesser Yellowlegs were usually present between the dates of 20 October and 15 February, with a maximum count of 48 birds on 17 January 1989. Elsewhere, FEH saw a single bird at Yabebyry on 25 March 1989; 20 near Carayaó on 14 September 1989; and 35 near Curuguaty on 16 September 1989. This species appears to be a common migrant and winter visitor in Paraguay.

SOLITARY SANDPIPER
(*TRINGA SOLITARIA*)

This species is a common migrant and winter visitor throughout Paraguay, where it has been recorded from Depts. Alto Paraguay (López

1985), Boquerón (Brodkorb 1938, Steinbacher 1962, 1968; specimens in MVZ), Presidente Hayes (Grant 1911, Bertoni 1930, Wetmore 1926, Short 1976, Peris and Suárez 1985, Peris et al. 1987), Concepción (Salvadori 1895, Brodkorb 1938, Laubmann 1939), San Pedro (Brodkorb 1938), Central (Contreras and González Romero 1988), Paraguari (Chubb 1910; specimen in MNHNP), Guairá (Dabbene 1912, Laubmann 1939, Partridge 1954) and Itapúa (Partridge 1954), between 25 August (Grant 1911) and 29 March (Steinbacher 1968). A specimen in UMMZ was taken on 7 November 1938 from 40 km WSW of Capitán Bado. The MNHNP has a male collected by M. R. Rolón at Parque Nacional Defensores del Chaco, Dept. Chaco (ca. 20°20'S, 60°30'W), on 31 October 1980. We observed this species at many localities in Paraguay, with maximum counts (by FEH) of 105 birds at Bahía Negra on 18 August 1988, and 51 at Guarambaré, Dept. Central (25°30'S, 57°26'W), on 25 December 1987. Our maximum count at Bahía de Asunción was nine birds on 9 November 1988. TGT frequently saw up to five birds 20 km SE of San Ignacio, Dept. Misiones, in 1987 and 1988. Noteworthy records of FEH include one bird near Tobatí, Dept. Cordillera, on 24 February 1987; 16 birds at Laguna Capitán on 1 April 1988; four at Estancia La Golondrina, Dept. Presidente Hayes, on 30 July 1989; one near Carayaó on 14 September 1989; and one near Curuguaty on 16 September 1989.

SPOTTED SANDPIPER
(*ACTITIS MACULARIA*)

This species has been recorded from Paraguay in Depts. Boquerón and Presidente Hayes, between December (Peris and Suárez 1985) and 28 March (Steinbacher 1962). A specimen in MNHNP was taken by M. R. Rolón at Parque Nacional Ybycui on 22 January 1981. On 19 February 1987, FEH observed two birds beside the Ruta Trans Chaco at Río Confuso, Dept. Presidente Hayes. In Dept. Alto Paraguay, SMG noted single birds near Puerto Esperanza on 19 September 1988, at Estancia Doña Julia on 26 and 27 September 1988, and one collected (UMMZ) at Puerto Ramos on 30 September 1988. JAF saw a single bird at Bahía de Asunción on 31 January 1989. This species appears to be an uncommon migrant and winter visitor along the upper Paraguay River, and rare elsewhere in Paraguay.

UPLAND SANDPIPER
(*BARTRAMIA LONGICAUDA*)

In Paraguay, this species has been recorded from Depts. Presidente Hayes (Wetmore 1926, Steinbacher 1968) and Concepción (Wetmore 1926), and southeastern Paraguay (Bertoni 1914), between 29 September and 12 January. The UMMZ has two specimens from 265 km W and one from 195 km W of Puerto Casado, Dept(s). Nueva Asunción, Alto Paraguay or Boquerón, and two specimens from Capitán Bado, collected between 25 September and 11 April. At Bahía de Asunción, Upland Sandpipers were usually present between 25 November and 28 February, with a maximum of 12 birds on 2 December 1988. Elsewhere, FEH observed single birds at Estancia La Golondrina on 14 November 1988, and at Loma Plata, Dept. Boquerón (22°21'S, 59°48'W), on 8 December 1989. This species is an uncommon migrant and winter visitor in Paraguay.

ESKIMO CURLEW (*NUMENIUS BOREALIS*)

Sharpe (1896) reported two adults, taken from Paraguay, in the British Museum (Natural History); one was dated 9 October. Bertoni (1899) stated that this species inhabited both dry and wet fields in Paraguay, arriving in flocks of 15 to 20 birds in September. This nearly extinct species appears to have been a regular winter visitor to Paraguay.

[**WHIMBREL** (*NUMENIUS PHAEOPUS*)]

Peris and Suárez (1985) reported Whimbrels to be "muy abundante" (very abundant) in the lower Paraguayan Chaco, Dept. Presidente Hayes, in December 1983. Because there are only two records of this species in the interior of South America, both from the Andes (Fjeldsá and Krabbe 1986), we consider this species hypothetical in Paraguay.

HUDSONIAN GODWIT (*LIMOSA HAEMASTICA*)

Steinbacher (1962) reported a male collected at Escalante, Dept. Presidente Hayes, on 19 September 1960. On 2 October 1939, two males and a female were collected 240 km W of Puerto Casado, Dept. Nueva Asunción or Boquerón (UMMZ). At Bahía de Asunción, FEH and JAF observed 25 birds on 9 November 1988, 37 the following day (photograph in AFARP), and smaller numbers thereafter until a single bird remained on 21 December 1988. NEL and R. Behrstock observed six birds at Concepción on

31 August 1989. On 21 October 1989, FEH noted single birds at Laguna Capitán and along the Ruta Trans Chaco 1 km S of Riacho San Carlos, Dept. Presidente Hayes (23°03'S, 59°15'W). The Hudsonian Godwit appears to be an uncommon fall migrant in Paraguay.

RED KNOT (*CALIDRIS CANUTUS*)

The only published records of this species in the interior of South America are sightings of single birds at Córdoba, Argentina, in November 1976 (Nores and Yzurieta 1979) and at La Cumbre, Dept. La Paz, Bolivia, on 2 October 1983 (Donahue 1986). Unpublished records include a juvenile, banded in Massachusetts on 7 September 1973 (USFWS band 722-19049), that was recovered in November 1973, at União de Vitória, Brazil, and several sight records from the Brazilian Pantanal in March (B. Harrington, pers. comm.). On 29 October 1987, FEH and F. A. de Medina photographed a winter-plumaged Red Knot foraging beside a Lesser Golden-Plover at Bahía de Asunción (AFARP, VIREO x08/6/004); the identification was confirmed by B. Harrington. FEH observed a second bird, also in winter plumage and foraging with Lesser Golden-Plovers, at Bahía de Asunción on 10 November 1988. These records, presumably of southward-bound migrants, are the first of the Red Knot for Paraguay, where it is probably a rare but regular fall migrant.

SANDERLING (*CALIDRIS ALBA*)

Sanderlings are rare in the interior of South America; the most noteworthy records are from Mendoza and Córdoba Provinces, Argentina (Pereyra 1927, Nores and Yzurieta 1979), and the Manu River, southeastern Peru (Bolster and Robinson 1990). Although Rappole et al. (1983) listed this species for Paraguay, there is no previous documentation of its occurrence in the country. On 17 November 1988, M. Angel, FEH and JAF photographed an adult Sanderling as it foraged with a large flock of White-rumped Sandpipers (*C. fuscicollis*) at Bahía de Asunción (AFARP, VIREO x08/2/002); the identification was confirmed by M. Robbins. This is the first documented record of this species in Paraguay. On 25 November 1988, FEH saw a Sanderling resting in a field with Lesser Golden-Plovers at Bahía de Asunción. These birds were probably southward-bound migrants. The Sanderling apparently is a rare fall migrant in Paraguay.

[SEMIPALMATED SANDPIPER (*CALIDRIS PUSILLA*)]

Wetmore (1927) saw a single bird at Puerto Pinasco, Dept. Presidente Hayes, on 1 September 1920, and a flock of 12 in the same region on 20 September 1920; no descriptions were given. Because of the possibility of confusing this species with other *Calidris* spp., we consider this sight record hypothetical.

LEAST SANDPIPER (*CALIDRIS MINUTILLA*)

Steinbacher (1962) reported a female collected at Lichtenau, Dept. Presidente Hayes, on 20 October 1960. On 5 January 1989, FEH and F. A. de Medina observed a Least Sandpiper from a distance of 15 m for about 8 min at Bahía de Asunción. The bird accompanied a flock of Collared Plovers (*Charadrius collaris*); it was slightly smaller than the plovers, and its legs were yellowish in contrast to its darker bill, thus distinguishing it from other possible *Calidris* spp. The Least Sandpiper appears to be a rare fall migrant and winter visitor in Paraguay, where it approaches the southern extent of its wintering range.

WHITE-RUMPED SANDPIPER (*CALIDRIS FUSCICOLLIS*)

In Paraguay, this species has been reported from Depts. Boquerón (Steinbacher 1962; specimens in MVZ), Presidente Hayes (Wetmore 1926, Steinbacher 1962, Short 1976), Concepción (Laubmann 1939) and Central (Contreras and González Romero 1988; specimens in FMNH), and southeastern Paraguay (Bertoni 1914), between 30 August (Myers and Myers 1979) and 6 November (Short 1976). The UMMZ has five specimens from Capitán Bado and 40 km WSW, collected between 7 September and 17 November. FEH and JAF frequently observed White-rumped Sandpipers at Bahía de Asunción between 20 October and 29 March, with a maximum of 243 birds on 17 November 1988. Their numbers tapered off in December, and increased somewhat from January to March; our highest count after December was 50 birds on 23 January 1989. Noteworthy records by FEH include three birds at Bahía Negra on 18 August 1988; one near Capiibary, Dept. San Pedro (24°49'S, 56°03'W), on 14 September 1989; and approximately 250 birds 5 km N of Curuguaty on 16 September 1989. This species appears to be a common fall migrant and an uncommon winter visitor and spring migrant in Paraguay.

[BAIRD'S SANDPIPER
(*CALIDRIS BAIRDII*)

Although listed for Paraguay by Meyer de Schauensee (1966), we are unable to locate any documentation of this species for the country. López (1985) reported 15 birds from Dept. Alto Paraguay, but the identification is suspect as neither Pectoral Sandpiper nor Buff-breasted Sandpiper (*Tryngites subruficollis*), both similar to Baird's Sandpiper and much more common in Paraguay, was listed.

PECTORAL SANDPIPER
(*CALIDRIS MELANOTOS*)

This species has been recorded from Depts. Alto Paraguay (Grant 1911), Boquerón (Steinbacher 1962; specimens in MVZ), Presidente Hayes (Wetmore 1926, Bertoni 1930, Steinbacher 1962, Short 1976), Concepción (Laubmann 1939) and Central (Myers and Myers 1979; specimens in FMNH), and southeastern Paraguay (Bertoni 1914), between 3 August (Myers and Myers 1979) and 7 March (Steinbacher 1962). The UMMZ has five specimens from 40 km WSW of Capitán Bado, and five more from 195–265 km W of Puerto Casado. We commonly observed fair numbers of this species in the Chaco and along the Paraguay River. At Bahía de Asunción, FEH and JAF observed this species as late as 7 April 1988, with a maximum of 200 birds recorded on 5 January 1989. New dept. records by FEH include five birds near Carayaó on 14 September 1989 and 250 birds near Curuguaty on 16 September 1989. The Pectoral Sandpiper is a common migrant and winter visitor in Paraguay.

STILT SANDPIPER
(*CALIDRIS HIMANTOPUS*)

In Paraguay, this species has been reported only from Dept. Presidente Hayes, where flocks of up to 40 birds have been recorded (Wetmore 1926), between 25 August (Myers and Myers 1979) and 30 September (Steinbacher 1962, 1968). FEH observed seven birds at Bahía Negra on 18 August 1988, and a single bird at Mariscal Estigarribia, Dept. Boquerón, on 3 September 1988. SMG noted a single bird along Riacho San Alberto, Dept. Alto Paraguay, on 19 September 1988. At Bahía de Asunción, three birds were observed on 9 November 1988, 34 on 17 November 1988, 22 on 22 November 1988, and three on 5 January 1989. This species appears to be an uncommon fall migrant and a rare winter visitor in Paraguay.

BUFF-BREASTED SANDPIPER
(*TRYNGITES SUBRUFICOLLIS*)

This species has been reported only in Dept. Presidente Hayes, between late August (Myers and Myers 1979) and 21 September (Wetmore 1926), and in southeastern Paraguay (Bertoni 1914). The MVZ has two specimens taken from 320 km NW of Villa Hayes, in Dept. Boquerón, on 3 September 1973. NEL collected a female (MNHNP) at Estancia Doña Julia on 26 September 1984. At Bahía de Asunción, Buff-breasted Sandpipers were usually present between 20 October and 25 November, with a maximum count of 35 birds on 25 October 1987; later records include single birds on 16 December 1987 and 8 March 1988, and eight on 17 January 1989. This species appears to be a fairly common fall migrant and a rare winter visitor and spring migrant in Paraguay. Its primary winter range appears to be further south in Argentina (Myers 1980).

WILSON'S PHALAROPE
(*PHALAROPUS TRICOLOR*)

This species has been reported from Depts. Boquerón and Presidente Hayes, between 3 and 27 September (Steinbacher 1962, 1968; Myers and Myers 1979), and from Dept. Guairá (Laubmann 1939). The UMMZ has a male taken from 235 km W of Riacho Negro (presumably at its confluence with the Paraguay River), Dept. Presidente Hayes, on 1 September 1939; two birds obtained from 265 km W of Puerto Casado, on 3 October 1936; and two specimens collected at Campo Esperanza, Dept. Presidente Hayes, on 15 October 1940. A specimen in MVZ was collected 320 km NW of Villa Hayes, in Dept. Boquerón, on 4 September 1973. On 20 and 21 October 1989, FEH saw a single bird along the Ruta Trans Chaco 1 km S of Riacho San Carlos. This species is apparently a rare fall migrant in Paraguay, occurring most frequently in ponds west of the Paraguay River.

RED PHALAROPE
(*PHALAROPUS FULICARIA*)

Brodkorb (1938) reported a female collected 170 km W of Puerto Casado, Dept. Alto Paraguay or Boquerón, on 5 March 1938.

ARCTIC TERN (*STERNA PARADISAEA*)

Although the Common Tern (*Sterna hirundo*) has been recorded from several inland localities in South America, including Bolivia (Di Costanzo

1978, Remsen and Traylor 1989), there appear to be no previous inland records for the Arctic Tern in South America. On May 1989, FEH and TGT found an adult Arctic Tern, in breeding plumage, fishing alone at Bahía de Asunción; it was photographed later that day (AFARP, VIR-EO X08/17/001) and was seen the following day by FEH and JAF. The identification was confirmed by K. Garrett and J. Dunn. The bird was presumably a northward-bound migrant.

BLACK-BILLED CUCKOO
(*COCCYZUS ERYTHROPTALMUS*)

Short (1972) reported a female collected at Lichtenau, Dept. Presidente Hayes, on 11 December 1970. FEH failed to find this bird in the central Paraguayan Chaco during 3 weeks of fieldwork in January, February, and December 1988. This species appears to be a rare winter visitor in Paraguay, where it reaches the southern limit of its winter distribution.

YELLOW-BILLED CUCKOO
(*COCCYZUS AMERICANUS*)

This species has been recorded from Depts. Boquerón (Steinbacher 1962; specimens in FMNH), Presidente Hayes (Kerr 1901, Short 1976), Concepción (Laubmann 1939), Amambay (López, undated) and Paraguari (Chubb 1910), between 12 August and 1 May (Short 1976). The UMMZ has a male collected from 265 km W of Puerto Casado on 14 October 1936; a female taken at Puerto Gibaja, Dept. Alto Paraná, on 3 September 1940; and a female obtained from 15 km E of Rosario on 8 February 1939. In January and February 1988, FEH observed this species nearly every day at Fortín Toledo (22°21'S, 60°20'W) and Filadelfia, Dept. Boquerón, where it appears to be a fairly common migrant and winter visitor. Elsewhere in Paraguay it is apparently rare.

COMMON NIGHTHAWK
(*CHORDEILES MINOR*)

This species has been reported from Depts. Boquerón (Steinbacher 1962), Presidente Hayes (Kerr 1901, Short 1976; specimens in FMNH), Concepción (Laubmann 1940; specimens in UMMZ), San Pedro (Brodkorb 1938, Laubmann 1940) and Central (Berlepsch 1887), between 20 January and 9 March. It is a common winter visitor in Dept. Central, where FEH has seen flocks of up to 25 birds between 5 December 1987 and 12 March 1988, at Guarambaré. We

found this species to be common in Depts. Boquerón and Concepción during the months of January and February. Noteworthy records include eight seen by FEH and TGT on 16 February 1988 near Ygatimí, Dept. Canindeyú, and single birds seen by FEH at Fuerte Olimpo, Dept. Alto Paraguay, on 27 October 1988, and at Capitán Miranda, Dept. Itapúa (27°14'S, 55°49'W), on 14 December 1988.

[ALDER/WILLOW FLYCATCHER
(*EMPIDONAX ALNORUM/TRAILLI*)

Although Fitzpatrick (1980) listed this species complex from Paraguay, there appears to be no published documentation of its occurrence in the country.

EASTERN KINGBIRD
(*TRYANNUS TYRANNUS*)

Single specimens have been taken in Dept. Boquerón from 50 km S of Orloff on 17 October 1956 (Steinbacher 1962), and at Teniente Ochoa (21°42'S, 61°02'W) on 26 October 1972 (Schmitt and Hubbard 1974). Contreras and González Romero (1988) reported this species from Asunción, but gave no details. The UMMZ has a specimen collected at Fortín Isla Po-i, Dept. Presidente Hayes, on 26 September 1936. Near Bahía Negra, FEH saw one or two birds on 28, 30 (photograph in AFARP), 31 January 1989, and 2 February 1989; these birds associated with Fork-tailed Flycatchers (*T. savanna*) and Tropical Kingbirds (*T. melancholicus*), foraging along the edge of the Paraguay River and in the canopy of nearby scrub forests. The Eastern Kingbird may be an uncommon migrant and winter visitor in the northern Paraguayan Chaco; further south it is rare, having been recorded as far as Misiones, Argentina (König 1979), and the Falkland Islands (Lévêque 1978).

PURPLE MARTIN (*PROGNE SUBIS*)

On 26 September 1988, SMG collected a female (UMMZ 226503) from a flock of 100+ Brown-chested Martins (*Phaeoprogne tapera*) at Estancia Doña Julia, Dept. Alto Paraguay; the identification was confirmed by R. W. Storer. This is the first documented record of this species for Paraguay. From 28 January to 7 February 1989, five entirely dark male martins were seen daily by FEH at Bahía Negra; these birds were accompanied by approximately 50 females and young males, each of which possessed a dark chest in contrast to their whitish underparts. The birds

were probably Purple Martins rather than Southern Martins (*Progne modesta*), which have more uniformly dusky underparts and have not been recorded from Paraguay. The Purple Martin may be a regular winter resident along the upper Paraguay River; it has been recorded in adjacent Bolivia (Remsen and Traylor 1989) and Mato Grosso, Brazil (Antas et al. 1986).

BANK SWALLOW (*RIPARIA RIPARIA*)

Brodkorb (1938) reported two males collected 120 km W of Puerto Pinasco, Dept. Presidente Hayes, on 4 January 1938. Contreras and González Romero (1988) listed this species without details from Asunción. In October 1988 and January 1989, FEH observed flocks of up to 20 birds at several localities in all Depts. bordering the Paraguay River north of Asunción. Elsewhere, FEH observed about 70 birds at Laguna Salada, Dept. Presidente Hayes (22°32'S, 59°18'W), on 1 April 1988; two at Villa Florida, Dept. Misiones, on 17 April 1988; two birds at Estancia La Golondrina on 6 November 1988 (with TGT); and one near Carayaó on 14 September 1989. From 11–17 September 1989, TGT observed nine birds, three of which were banded, at Parque Nacional Defensores del Chaco. The Bank Swallow appears to be an uncommon migrant and winter visitor in Paraguay.

CLIFF SWALLOW (*HIRUNDO PYRRHONOTA*)

Schade and Pallerés (1971) reported a specimen from Paraguay, but did not provide any details. On 4 January 1938, an adult female was taken from 120 km W of Puerto Pinasco (UMMZ). On 9 November 1980, M. R. Rolón collected an adult male at Parque Nacional Defensores del Chaco (MNHNP). Observations by FEH include flocks of up to 80 birds in Depts. Central and Misiones on many occasions; 15 at Villa Florida on 17 April 1988; one at Estancia La Golondrina on 6 November 1988 (with TGT); one at Coronel Bogado, Dept. Itapúa (27°12'W, 56°11'W), on 15 December 1988; 20+ at Emboscada, Dept. Cordillera (25°09'S, 57°20'W), on 1 January 1989; two at Puerto Esperanza on 27 January 1989; three at Bahía Negra on 29 January 1989; 50+ at Parque Nacional Ybycui on 27 February 1989; three near San Cosme y Damián on 23 March 1989; and 15 near Carayaó on 14 September 1989. This species appears to be a fairly common migrant and winter visitor in Paraguay.

BARN SWALLOW (*HIRUNDO RUSTICA*)

In Paraguay, this species has been recorded from Depts. Alto Paraguay (López 1985), Boquerón (specimen in FMNH), Presidente Hayes (Wetmore 1926, Peris et al. 1987), San Pedro (Laubmann 1940), Central (Bertoni 1914, 1930), and Itapúa (Bertoni 1914), between 24 September (Wetmore 1926) and 28 February (Laubmann 1940). The Barn Swallow is a common migrant and winter visitor in Paraguay, occurring in flocks of up to several hundred birds. FEH has observed it as early as 3 September 1988 at Mariscal Estigarribia (three birds), and as late as 17 April 1988 at Villa Florida (one bird). Barn Swallows are ubiquitous along the Paraguay River, where we have observed them in each bordering dept., and in fields and marshes throughout Depts. Chaco, Presidente Hayes, Caaguazú, Canindeyú, Cordillera, Central Paraguari, Misiones, and Itapúa.

[SWAINSON'S THRUSH (*CATHARUS USTULATUS*)]

Bertoni (1914) listed this species from Puerto Bertoni, but gave no details.

BOBOLINK (*DOLICHONYX ORYZIVORUS*)

This species has been recorded from Depts. Boquerón (Steinbacher 1968; specimens in MAS), Presidente Hayes (Bertoni 1930, Steinbacher 1962; specimens in MAS and IML), Concepción (Laubmann 1940), Caaguazú (Salvadori 1895), and Alto Paraná (Bertoni 1914, 1926), between 20 September (Laubmann 1940) and 25 March (Steinbacher 1968). The UMMZ has two specimens from 3 km E of Horqueta, taken on 12 November 1937; two from 170 km W of Puerto Casado, taken on 12 and 19 February 1938; and one from 265 km W of Puerto Casado, taken on 31 January 1938. At Bahía de Asunción, FEH and JAF observed 12 Bobolinks on 22 November 1988, 80 on 25 November 1988, and 40 on 2 December 1988; all were in winter plumage. The Bobolink appears to be an uncommon migrant and winter visitor in Paraguay.

FAUNAL COMPOSITION AND REGIONAL COMPARISONS

Thus far 32 species of North American bird migrants have been documented from Paraguay. Although other species undoubtedly will be added, the present list is complete enough to warrant

TABLE 1. Comparison of North American bird migrant species by family and ecological groups (percent composition in parentheses) in five selected Neotropical regions.

Family	Southwestern Peru	Venezuela	Rio Grande do Sul	Bolivia	Paraguay
Ardeidae	—	5	—	—	—
Anatidae	1	6	1	—	—
Accipitridae	2	2	2	4	3
Falconidae	1	2	1	1	1
Rallidae	—	1	—	—	—
Charadriidae	3	5	3	3	2
Scolopacidae	26	21	20	15	16
Laridae	14	9	4	2	1
Cuculidae	1	2	1	2	2
Caprimulgidae	—	2	1	—	1
Apodidae	1	1	—	—	—
Alcedinidae	—	1	—	—	—
Tyrannidae	2	5	—	6	1
Hirundinidae	3	4	3	4	4
Muscicapidae	1	3	—	2	—
Bombycillidae	—	1	—	—	—
Vireonidae	—	1	—	—	—
Emberizidae	2	33	1	7	1
Total families	12	18	10	11	10
Total species	57	104	37	46	32
Aquatic nonpasserines	45 (79)	49 (47)	29 (78)	21 (46)	20 (63)
Terrestrial nonpasserines	4 (7)	8 (8)	4 (11)	6 (13)	6 (19)
Passerines	8 (14)	47 (45)	4 (11)	19 (41)	6 (19)

comparison with other Neotropical areas. To facilitate such a comparison, we compiled lists of Nearctic bird migrants (excluding pelagic species) recorded from the following four regions: southwest Peru (based on Hughes 1988); Venezuela (Meyer de Schauensee and Phelps 1978); Rio Grande do Sul, Brazil (Belton 1985); and Bolivia (Remsen and Traylor 1989). A comparison of Nearctic migrants by family and ecological groups for Paraguay and each of these four geographic regions is presented in Table 1.

The most striking pattern in this comparison is the reduction of migrant species, especially passerines, at the more southerly localities. Venezuela boasts a fauna of 104 Nearctic migrant species, whereas Rio Grande do Sul, Bolivia and Paraguay each have less than 50. Paraguay is the most depauperate of these regions. Passerines comprise nearly half of the migrant bird species in Venezuela, but only 11% of the migrant fauna of Rio Grande do Sul, the southernmost locality. Like Rio Grande do Sul, Paraguay has only a few long-distance passerine migrants, consisting chiefly of hirundinids. Although emberizids make up more than a quarter of Venezuela's migrant fauna, few species penetrate the continent south

of the Amazon River, and only one as far as Paraguay. There is also a paucity of aquatic nonpasserines in the inland localities of Bolivia and Paraguay, although this group nevertheless comprises nearly half of the Nearctic migrant fauna in Bolivia and nearly two-thirds in Paraguay. Scolopacids alone account for half of Paraguay's migrant fauna. The number of terrestrial nonpasserine migrants varies little between these regions, never constituting more than a fifth of the total migrant fauna.

FOOD AND HABITAT USE

Terrestrial and aquatic invertebrates constitute the most significant items in the diets of North American bird migrants in Paraguay; terrestrial invertebrates are consumed to some extent by all 32 species, whereas aquatic invertebrates are used by 18 (Table 2). Less frequently used food items include fruits (used by seven species), seeds (five species), terrestrial vertebrates (five species), aquatic vertebrates (five species), terrestrial plants (one species), and aquatic plants (one species). Habitats most frequently utilized for foraging by Nearctic migrants in Paraguay (Table 2) include beaches (used by 19 species), marshes

TABLE 2. Summary of food items (based mostly on Rappole et al. 1983) and foraging habitats used by North American bird migrants in Paraguay. For food items, small case letters refer to items constituting a small portion of the normal diet. For habitats, upper case X refers to more frequently used habitats; lower case x refers to less frequently used habitats. Beaches include water shallow enough for wading; water refers to deeper open water.

Species	Food items*	Habitats				
		Forests	Fields	Marshes	Beaches	Water
Mississippi Kite	TI, tv	x	X	x	—	—
Swainson's Hawk	TI, tv	—	X	—	—	—
Osprey	AV, ti, tv	—	—	—	x	X
Peregrine Falcon	TV, ti	—	—	X	X	—
Black-bellied Plover	AI, TI, tp	—	—	—	X	—
Lesser Golden-Plover	AI, TI, f	—	x	x	X	—
Solitary Sandpiper	AI, ti	—	—	X	X	—
Lesser Yellowlegs	AI, ti	—	—	X	X	—
Greater Yellowlegs	AI, av, ti	—	—	X	X	—
Spotted Sandpiper	AI, TI, av	—	—	—	X	—
Red Knot	AI, TI	—	—	—	X	—
Sanderling	AI, TI	—	—	—	X	—
Least Sandpiper	AI, TI	—	—	—	X	—
White-rumped Sandpiper	AI, TI	—	—	x	X	—
Pectoral Sandpiper	AI, TI	—	x	X	x	—
Stilt Sandpiper	AI, ap, av, s, ti, tv	—	—	—	X	—
Buff-breasted Sandpiper	TI, ai	—	X	X	X	—
Upland Sandpiper	TI, ai, s	—	X	—	—	—
Eskimo Curlew	ai, f, TI	—	X	—	—	—
Hudsonian Godwit	AI, ti	—	—	x	X	—
Red Phalarope	AI, ti	—	—	—	?	?
Wilson's Phalarope	AI, TI	—	—	—	X	?
Arctic Tern	AV, ai, ti	—	—	—	—	X
Black-billed Cuckoo	F, S, ti	X	—	—	—	—
Yellow-billed Cuckoo	F, S, ti	X	—	—	—	—
Common Nighthawk	TI	X	X	x	—	—
Eastern Kingbird	F, TI	X	x	x	—	—
Purple Martin	TI	x	X	x	—	x
Bank Swallow	TI	—	x	x	x	X
Barn Swallow	TI, f	x	X	X	x	X
Cliff Swallow	TI, f	x	X	x	—	x
Bobolink	S, TI	—	—	X	—	—

* AI = aquatic invertebrates; AP = aquatic plants; AV = aquatic vertebrates; F = fruits; S = seeds; TI = terrestrial invertebrates; TP = terrestrial plants; TV = terrestrial vertebrates.

(17 species), fields (13 species), forests (eight species), and open water (six species).

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