

NEW AND NOTEWORTHY OBSERVATIONS OF RAPTORS IN SOUTHWARD MIGRATION IN NICARAGUA

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Resumen. – Observaciones nuevas y notables de aves rapaces en migración hacia el sur en Nicaragua. – Presentamos registros notables de avistamiento de 12 especies de aves rapaces durante su migración hacia el sur en Nicaragua, incluyendo registros nuevos del Caracara Cabecigualdo (*Milvago chimachima*), y nuevos registros de esta y ocho especies más en migración. Además, demostramos una migración significativa hacia el sur del Zopilote Negro (*Coragyps atratus*) con más de 200,000 individuos, y documentamos más de 200 individuos del Gavilán de Cooper (*Accipiter cooperi*) en migración. También reportamos la migración de varias especies no rapaces que parecen utilizar las mismas rutas de migración en forma diurna. Realizamos estas observaciones durante el monitoreo de migración de rapaces hacia el sur por el centro y el suroeste de Nicaragua del 26 de Agosto al 18 de Noviembre de 2006. Comentamos sobre la hipótesis que la expansión de rango de hábitat podría hacerse a través de la adopción de migraciones temporales.

Abstract. – We present noteworthy sight records for 12 raptor species in southward migration in Nicaragua, including new country records for the Yellow-headed Caracara (*Milvago chimachima*), and new records for it and eight other raptor species in migration. Additionally, we demonstrate a significant Black Vulture (*Coragyps atratus*) southward migration involving more than 200,000 individuals, and we document over 200 Cooper's Hawks (*Accipiter cooperi*), in migration. We also report the migration of several non-raptor species which appear to utilize the same pathways during day time. These observations were made while monitoring southward raptor migration through central and southwestern Nicaragua from 26 August to 18 November 2006. We comment upon the hypothesis that range expansion may be accomplished through adoption of seasonal migrations. *Accepted 3 September 2008.*

Key words: Raptors, migration, Nicaragua.

INTRODUCTION

Diurnal seasonal migration is performed by large numbers of non-passerine birds. Most of the birds flying to/from North America, especially raptors, use overland pathways in Mesoamerica (Bildstein 2004), where the birds are generally visible to the human eye. Nonetheless, there is relatively little knowl-

edge about their migration patterns and what conservation issues are important on their flyways. Most raptor species found in the US warrant special attention because of population losses, and most of those are at least partially migratory (Bildstein & Zalles 2001). However, much more basic information is needed on migration pathways, timing, resource use, and species-specific population

estimates in migration, in order to provide proper conservation.

Nicaragua lies on the migration routes for most Nearctic-Neotropical temperate-tropical migrating system for raptors, given that it spans the width of the Mesoamerican isthmus. Studies of only two southward raptor migrations have been reported there, giving data on 14 species (Arengi & McCrary 2004). Although seasonal temperature variations in Nicaragua are relatively small, the variation in precipitation and winds between the rainy (low-wind) period (May through November in the Pacific region) and the dry (high-wind) period (December through April) is remarkable, provoking extreme differences in river flows and ground moisture, and requiring significant adaptations in vegetation water cycles (Salas 1993). Long-distance seasonal avian migration is linked somehow to the end of each of these seasons, although relatively little is known about pathways, dynamics and southern habitats for many migratory species, particularly among raptors; even less is known about short-distance, irregular and local migrations among raptors (Bildstein 2004).

Here, we report observations of southward migration in Nicaragua of 12 raptor species which merit mention because they are new species reports or are significantly distinct from previous findings. One of these species is reported for the first time in Nicaragua and there are first reports of nine species in southward migration in Nicaragua.

STUDY AREAS

Banderas (12.38°N, 85.88°W). A corridor of flatland limited to the west by Lake Managua, and to the east by the Cordillera Chontaleña running NW-SE. About 25 km directly south of this observation point lies Lake Nicaragua.

Rivas (11.35°N, 85.77°W). Bounded to the east by Lake Nicaragua and to the west by moun-

tains running approximately 2–3 km east of the Pacific Ocean. Monitoring from two locations: one within approximately 1 km of the lakeshore, and another approximately centrally located within the isthmus between lake Nicaragua and the Pacific Ocean.

METHODS

During the 2006 southward migration, from 26 August to 18 November, we monitored the movement of raptors through Banderas, east of Lake Managua, and Rivas, west of Lake Nicaragua. In Rivas, time and direction of flight, altitude above ground and minimum horizontal distance from the observer were noted, along with flight type (soaring, gliding, flapping flight, hunting, perched), as an assessment of migration activity. In Banderas, total migrating individuals per species were hourly summed. We judged birds to be migrating in Banderas if they made sustained, directional flight in any southward direction or eastward flights, which would run along the ridge directly to the north of the observers. We previously established that raptors tend to move eastwardly before continuing southward along the ridges to the east of Lake Nicaragua (Arengi & McCrary 2004), although from the sighting location, we could not always observe the birds turning southward along the ridge. Prevailing winds were from the east, although very light or alternating with winds from south some days in Banderas due to low pressure fronts.

Birds were counted using hand-held binoculars and a spotting scope at Banderas. Binoculars were used at the Rivas sites and a spotting scope was rotated between the two sites every few days. Identification was aided particularly by a summary of flight, shape and color patterns taken from several sources (Dunne *et al.* 1988, Stiles & Skutch 1989, Howell & Webb 1995, Wheeler & Clark 1995,

TABLE 1: New and notable records of diurnal migrating birds, 2006.

Species	Range of dates of observation	Number sighted	Location
RAPTORS			
Black Vulture (<i>Coragyps atratus</i>)	26 August-18 November	221,116	Banderas
	12 October-25 November	19,030	Rivas
King Vulture (<i>Sarcoramphus papa</i>) ²	23 October-10 November	3	Rivas
Hook-billed Kite (<i>Chondrohierax uncinatus</i>) ²	8 September	1	Banderas
Swallow-tailed Kite (<i>Elanoides forficatus</i>)	22 October-19 November	8	Rivas
White-tailed Kite (<i>Elanus leucurus</i>) ²	3 October	1	Banderas
	31 October	2	Rivas
Snail Kite (<i>Rostrhamus sociabilis</i>) ²	26 October-29 October	3	Rivas
Cooper's Hawk (<i>Accipiter cooperi</i>)	13 October-13 November	16	Rivas
	7 September-9 November	235	Banderas
Harris' Hawk (<i>Parabuteo unicinctus</i>) ²	10 November	1	Rivas
Grey Hawk (<i>Asturina nitida</i>) ²	20 October-2 November	5	Rivas
Short-tailed Hawk (<i>Buteo brachyurus</i>) ²	6 November	1	Banderas
Zone-tailed Hawk (<i>Buteo albonotatus</i>) ²	2 October-3 November	230	Banderas
	27 October-25 November	10	Rivas
Yellow-headed Caracara (<i>Milvago chiMachima</i>) ^{1,2}	26 October-14 November	7	Rivas
NON-RAPTORS			
Great Blue Heron (<i>Ardea herodias</i>) ²	30 September	1	Banderas
	21 October-3 November	4	Rivas
Wood Stork (<i>Mycteria americana</i>) ²	6 November-21 November	248	Banderas
	16 October-16 November	118	Rivas
Lesser Nighthawk (<i>Chordeiles acutipennis</i>) ²	7-25 October	220	Banderas
Eastern Kingbird (<i>Tyrannus tyrannus</i>)	8 September-24 September	260	Banderas
Scissor-tailed Flycatcher (<i>Tyrannus forficatus</i>) ²	13 November	300	Banderas
Great Crested Flycatcher (<i>Myiarchus crinitus</i>) ²	17 October	1	Banderas
Swallows ³	8 September-23 September	50,000+	Banderas
	3 October - 31 October	50,000+	Rivas
Northern Oriole (<i>Icterus galbula</i>) ²	17 October	2	Banderas

¹ First report of species in Nicaragua.

² First report of species in migration in Nicaragua.

³ Barn Swallow (*Hirundo rustica*), Purple Martin (*Progne subis*), Tree Swallow (*Tachycineta bicolor*), Bank Swallow (*Riparia riparia*), Cliff Swallow (*Hirundo pyrrhonota*) and Northern Rough-winged Swallow (*Stelgidopteryx serripennis*).

Sibley 2000). We noted in passing a number of observations of southward migration of non-raptors during the study, which are also reported below.

RESULTS AND DISCUSSION

Our observations are summarized in Table 1. We observed the Yellow-headed Caracara

(*Milvago chimachima*) for the first time in Nicaragua, and we made first observations in southward migration in Nicaragua of it and of the King Vulture (*Sarcoramphus papa*), Hook-billed Kite (*Chondrohierax uncinnatus*), White-tailed Kite (*Elanus leucurus*), Snail Kite (*Rostrhamus sociabilis*), Harris' Hawk (*Parabuteo unicinctus*), Grey Hawk (*Asturina nitida*), Short-tailed Hawk (*Buteo brachyurus*), and the Zone-tailed Hawk (*Buteo albonotatus*). We give new information on the migration of Black Vulture (*Coragyps atratus*), Swallow-tailed Kite (*Elanoides forficatus*), and Cooper's Hawk (*Accipiter cooperii*) and on the migration of several non-raptors along the raptor flyways. In addition, we observed migrations of several non-raptor species, which are also discussed below.

Bildstein (2004) classified the Black Vulture as a partial migrant with some altitudinal migrations. In contrast to earlier estimations of fewer than 500 individuals in migration along the Mesoamerican Land Corridor (Bildstein & Zalles 2001), 1840 individuals were seen in southward migration at the Banderas site in 2001 and 15,795 individuals in 2002 (Arengi & McCrary 2004). We considered counts made on this species at Banderas in 2001–2002 to be very conservative, given that non-migrating Black Vultures are “ubiquitous” in Nicaragua. Many Black Vultures passing were considered wanderers and not recorded (J. McCrary unpubl.). Because we began the present study one month earlier than previous studies in Banderas (Arengi & McCrary 2004), and because we focussed more closely on the Black Vulture movements, we documented a far greater number of migrating individuals. We observed 221,116 Black Vultures at Banderas and 19,030 at Rivas displaying movement patterns consistent with southward migration. It is conceivable that many Black Vultures migrate from the Pacific coastal plain of Nicaragua to the Costa Rican highlands (an altitudinal

migration), or are making a concerted southward migration. The observations from this study contrasted greatly with records from Kekoldi, Costa Rica, in overall numbers of migrant Black Vultures (www.kekoldi.org).

One King Vulture was sighted in Rivas 12 October where it was soaring without a clear trajectory. We observed one in southward migration on three occasions, from 23 October to 10 November. They flew from 100 to 500 m above ground, soaring or gliding, without much flapping. Three were sighted soaring together in Rivas on 30 November, along the ridge without any clear direction. The King Vulture requires some forest cover (Stiles & Skutch 1989) and is resident throughout Central America. It is rare to uncommon or completely absent, however, from much of the Pacific region of Nicaragua (McCrary unpubl.), and this is likely the only recent observation of three individuals of this species in the southern Pacific region of Nicaragua. Our observations suggested that a small, and possibly viable, population remains in the Rivas area, and also suggested that these birds may very well be making partial short-range migrations. Although this species has not been previously documented in migration in Nicaragua, it is regarded as an irruptive or local migrant, along with two closely related species, the California (*Gymnogyps californianus*) and Andean (*Vultur gryphus*) condors (Bildstein *et al.* 2000, Bildstein 2004). Our observations of three individuals remaining in the area well after the end of the southward migration period, however (after 15 November 2006), suggested migration may not involve all individuals.

The Hook-billed Kite is an irregular or local, altitudinal migrant (Bildstein 2004). A perched mature female was observed at the Banderas site that took flight at 08:30 h, engaging in flapping, circular flight until it reached approximately 50 m height, and disappeared, apparently moving eastward. This

is the only sighting of the species at this location, and is the first report of the species in migration in Nicaragua.

We observed eight Swallow-tailed Kites migrating southward in Rivas between 22 October and 19 November. It is considered a regular, long-range migrant in Mesoamerica, with fewer than 2000 individuals involved in southward migration counts (Bildstein & Zalles 2001). It has been reported in northward migration in Costa Rica (Bildstein & Saborio 2000). One was sighted each year in southward migration in 2001 and 2002 in Banderas (Arengi & McCrary 2004).

The White-tailed Kite is common in the Pacific region of Nicaragua, although it has not been documented in seasonal latitudinal migration (Arengi & McCrary 2004). Fewer than 500 were estimated to participate in migration in Mesoamerica (Bildstein & Zalles 2001). We sighted one individual in migration with Black Vultures and Broad-winged Hawks at the Banderas site on 3 October. In Rivas, one and two individuals were seen in southward migration, on 3 October and 31 October, respectively. This constitutes the first report of seasonal migration for this species in Nicaragua.

We saw three Snail Kites moving southward through the Rivas site 26–29 October, although Snail Kites frequently appeared near the Lake Nicaragua coast in Rivas during the entirety of our study. This species is considered a mainly tropical, partial migrant (Bildstein 2004), but is not documented in migration along the Mesoamerican Land Corridor (Bildstein & Zalles 2001). This is the first report of migration of this species in Nicaragua.

First recorded in Nicaragua only a few years ago in migration (Arengi & McCrary 2004), Cooper's Hawk is likely a regular but infrequent passage migrant and winter resident, with its winter range reaching regularly

to Honduras, and “rarely but probably regularly to Costa Rica, casually to Colombia” (Stiles & Skutch 1989). One individual was sighted in migration in El Salvador in 1994 (Komar 2003). No more than 10,000 individuals reach Mesoamerica (Bildstein & Zalles 2001). In 2002, 19 were counted in the southward migration in Banderas (Arengi & McCrary 2004). We counted 235 during the 2006 southward migration in Banderas, and 16 in Rivas (13 October–13 November). This species was distinguished from Sharp-shinned Hawk (*Accipiter striatus*) by a tail appearing to be longer than the body, a broad white terminal band on the tail, head projecting in front of wings, frequent soaring and relatively slower flapping.

One Harris' Hawk was soaring southwardly at 50–100 m above ground 10 November in Rivas. This hawk is considered an irregular, partial migrant (Bildstein & Zalles 2001, Bildstein 2004). Our sighting constitutes the first of this species in migration in Nicaragua.

The Grey Hawk is documented as a partial migrant, in which fewer than 500 individuals are estimated to participate in migration (Bildstein & Zalles 2001). We saw one individual each on five separate occasions moving southward in soaring or gliding flight in Rivas between 20 October and 2 November, suggesting seasonal migration. Additionally, a pair maintained territory around the hill site in Rivas during the study, where it was seen and/or heard practically daily. This report is the first for this species in seasonal migration in Nicaragua.

Even though non-migrating Short-tailed Hawks were seen almost daily in Rivas during our study, one was observed flying southward with Black Vultures in Banderas on 6 November. Short-tailed Hawks are considered partial migrant with unknown total estimates (Bildstein & Zalles 2001). This is a first report of this species in migration in Nicaragua. Non-

migrating individuals were frequently seen in Rivas during the period.

The Zone-tailed Hawk is easily mistaken for the Turkey Vulture, which it accompanies regularly. Although reported as a resident in Nicaragua (Martínez-Sánchez 2000), it has not been documented in migration in Nicaragua. We saw 230 individuals in migration through Banderas and ten in migration through Rivas. We also made four separate observations of single soaring Zone-tailed Hawks which were heading northward or moving in no determined direction. Clearly, not all Zone-tailed Hawks found in Nicaragua migrate, although our observations showed that many do. In all instances, they were in a flock including Turkey Vultures. We consider that the lack of previous reports in migration in Nicaragua (Arenzi & McCrary 2004) was due to their similarity to Turkey Vultures and thus overlooked. It is considered a partial migrant (Bildstein & Zalles 2001), with fewer than 500 migrating along the Mesoamerican land corridor. Five individuals were seen in likely migration in El Salvador in 1994 (Komar 2003).

The Yellow-headed Caracara, once limited to Panama and southward, has been undergoing a range expansion along with pasture land expansion in Costa Rica for more than two decades (Stiles & Skutch 1989). Lorenzo López and McCrary first sighted one eating a dead fish on the shore of Lake Nicaragua at Santo Domingo, Ometepe Island, 23 December, 2001 (JKM unpubl.). One was observed 10 October in Rivas, flying about 1 m above ground, chasing doves and swallows unsuccessfully; there was no migratory behavior. Starting on 26 October, we observed southward migration of this species at the Rivas site, through 14 November, a total of seven individuals travelling as singles or pairs. Our documentation here constitutes the first published report of this species in Nicaragua. This species breeds in August and fledges in

September in Brazil (Johansson *et al.* 1999). This species is by no means common in Nicaragua or the Rivas region, at least yet, but our multiple observations in 2006 coupled with our 2001 observation suggest that it is not an accidental. Its apparent use of the migration pathway in western Nicaragua suggests that it may be utilizing migration for range expansion. However, we did not ever document this species in Banderas, so its range in Nicaragua may still be restricted to the southern Pacific region. This species is known to be an irregular or local, partial migrant, and its congener from South America, the Chimango Caracara (*Milvago chimango*), is known to participate in annual partial migrations (Bildstein 2004).

The Great Blue Heron (*Ardea herodias*) is considered a non-breeding migrant in both Nicaragua (Martínez-Sánchez 2000) and Costa Rica (Stiles & Skutch 1989). We saw a single individual flying southward in directed, flapping flight in Banderas on 23 September, and in Rivas, we saw four flying southward between 21 October and 3 November. Although not at the elevation of the raptors, we consider it noteworthy that they used the raptor migration routes diurnally. The Wood Stork (*Mycteria americana*) is a partial migrant with local seasonal variations in abundance (Stiles & Skutch 1989). We observed southward migration of 248 Wood Storks in Banderas and 118 in Rivas. They were usually found in groups of 10 to several dozen. This is a first account of migration of this species in Nicaragua.

Twenty Lesser Nighthawks (*Chordeiles acutipennis*) were sighted in southward migration at 17:30 h in Banderas on 7 October, and 200 were sighted moving southward in a flock at 16:30 h on 25 October. This constitutes a first report of migration of this species in Nicaragua. Although the Eastern Kingbird (*Tyrannus tyrannus*) is a passage migrant through Nicaraguan latitudes, the first record

of the species in Nicaragua occurred in an earlier report of southward raptor migration at Banderas (Arengi & McCrary 2004), and has been reported in southward diurnal migration in SE Costa Rica (Ralph *et al.* 2005). We observed a flock of 250 in Banderas on 8 September moving southward at 3–5 m height, just above the canopy. We saw 10 feeding on *Casearia corymbosa* (Flacourtiaceae) fruit on 24 September, and they continued southward after feeding and resting. The Scissor-tailed Flycatcher (*Tyrannus forficatus*) is a non-breeding migrant in Nicaragua (Martínez-Sánchez 2000), and is locally abundant during its seasonal residence in Nicaragua. A single flock of 300 was seen in southward flight 13 November in Banderas. One Great Crested Flycatcher (*Myiarchus crinitus*) was seen moving southward with two Northern Orioles (*Icterus galbula*) 17 October in Banderas. They flew into a nearby tree, remained for several minutes, then moved southward some 50 m to another tree, then within one minute, they headed further south above the forest. It is a non-breeding migrant in Nicaragua (Martínez-Sánchez 2000).

Dense migrations of swallows passed our monitoring sites during September and October. On several occasions, we counted southward passage of swallows in excess of 250 birds per minute, both in Banderas and in Rivas. There were Barn Swallows (*Hirundo rustica*), Purple Martins (*Progne subis*), Tree (*Tachycineta bicolor*), Bank (*Riparia riparia*), Cliff (*Hirundo pyrrhonota*) and Northern Rough-winged (*Stelgidopteryx serripennis*) swallows. Barn and Cliff swallow have been seen in southward diurnal migration in NE Costa Rica (Ralph *et al.* 2005).

The Northern Oriole (*Icteria galbula*) is a non-breeding migrant in Nicaragua (Martínez-Sánchez 2000). One adult male and one adult female were seen moving southward with one Great Crested Flycatcher (see above) 17 October in Banderas.

Diurnal, seasonal partial migrations develop among birds, for instance among introduced Cattle Egret (*Bubulcus ibis*) in the Americas (Kushland 1981). The Yellow-headed Caracara appears to be utilizing migration routes in its recent range expansion into Nicaragua. Our results suggested that several individuals already inhabit Nicaragua seasonally, and that the Nicaraguan population is migratory. The Pacific slope of Nicaragua becomes dry, beginning in November when the Yellow-headed Caracara population will have already headed southward, presumably toward humid tropical forests along the Pacific slope of southern Costa Rica and Panama. How far this species continues to progress and whether the colonizing population maintains migration is unknown. Whereas most migrating raptors we observed belong to the so-called Nearctic-Neotropical temperate-tropical migrating system, the Yellow-headed Caracara and other short-distance migrants we observed belong to the South American Temperate-Tropical (SATI) Migrating System, and it appears to be developing a “southern home” migration strategy (Joseph 1997).

These reports raise questions about the seasonal habitats of short-distance migrants. We hypothesize that much of the short-distance seasonal migration occurs in lowlands in Pacific Nicaragua into highlands in Costa Rica. However, birds such as Snail Kite and Yellow-headed Caracara, and possibly the White-tailed Kite, likely remain in lowlands even in their southern range. The massive Black Vulture migration reported here has not been reported at other Mesoamerican sites. Nicaragua is particularly “blessed” with an extremely large, conspicuous population of Black Vultures, and migrant subpopulations may account for the seasonality of resources in the Pacific region of Nicaragua. More observations of these species in migration would be useful in characterizing their ranges

by season and determine the role of seasonality in their migrations.

The utilization of the raptor flyway by non-raptors has been repeatedly noted by our observers, and is reflected in this report. Although the flight dynamics of non-raptors differed from raptors, we suspect that the migrations of the noted non-raptors may utilize visual cues of migration from the raptors themselves for choices of routes.

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