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MIGRATORY MOVEMENTS OF THE WHITE-THROATED HAWK (*BUTEO ALBIGULA*) IN CHILE

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ABSTRACT.—Flights of White-throated Hawks (*Buteo albigula*) were monitored from two mountains in central Chile (33°24'S, 70°28'W, 33°22'S, 70°21'W) in 1987–88 and 1996–98 and the data were augmented with observations from 1990–98 in several areas of Chile. I observed 291 hawks migrating in a north to south direction at the two mountain tops in October and from south to north in March and April. The hawks migrated in concentrated groups at all times of the day. Surveys in other areas between 22–41°S latitude resulted in 35 observations of White-throated Hawks that were migrating from south to north during April and from north to south during September and October. I observed breeding in native temperate forests between 38–39°S latitude in November and in February, and resident hawks in forested areas between 33–41°S latitude. My results indicated that White-throated Hawks used native austral forests for breeding and migrated to the northern Andes in austral winter, probably up to Venezuela and Colombia. Destruction of forests in southern Chile and Argentina may have serious consequences on this forest-dwelling hawk. Therefore, counting hawks along migratory routes could be an efficient method for monitoring its population status.

KEY WORDS: *White-throated Hawk*; Buteo albigula; *Chile*; *migration*; *temperate forests.*

Movimientos migratorios de *Buteo albígula* en Chile

RESUMEN.—Los antecedentes sobre la taxonomía y estado de residencia del aguilucho chico son escasos. Desde dos localidades montañosas en Chile central (33°24'S, 70°28'W, 33°22'S, 70°21'W) se monitoreó vuelos de aguiluchos entre 1987–88, y entre 1996–98. Además, entre 1990–98 se realizaron avistamientos de aguiluchos chicos en diversas localidades de Chile. El monitoreo desde dos puntos fijos dio un total de 291 aguiluchos registrados en vuelo migratorio, de norte a sur durante octubre, y de sur a norte en marzo y abril. Los aguiluchos mostraron una tendencia a pasar concentrados en bandadas, sin un patrón horario definido. Los registros en diversas localidades dieron un total de 35 aguiluchos entre los 22–41°S, observándose desplazamientos de sur a norte principalmente en abril, y de norte a sur en septiembre y octubre, además de actividad de reproducción en bosques naturales templados entre los 38–39°S en noviembre y febrero, y de ejemplares temporalmente establecidos en localidades con bosques naturales entre 33–41°S. Los resultados indican un comportamiento migratorio de esta especie, ocupando para la reproducción bosques nativos australes y desplazándose hacia los Andes septentrionales para invernar, probablemente hasta Venezuela y Colombia. Considerando la elevada tasa de destrucción del bosque templado austral, lo que podría tener graves consecuencias para la avifauna forestal, el conteo de aguiluchos en rutas migratorias se plantea como un eficiente método para monitorear su situación poblacional.

[Traducción del autor]

The taxonomic and migratory status of the White-throated Hawk (*Buteo albigula*) has been confusing since it was first described (Philippi 1899). It has been considered a subspecies of *Buteo platypterus* by Philippi (1943) and a subspecies of *B. brachyurus* by Brown and Amadon (1968). Its distribution includes the Andes Cordillera from northwestern Venezuela to southern Chile (Brown and Amadon 1968). It has been observed in Venezuela (Phelps and de Schauensee 1978), in the cordillera of Ecuador (Lehmann and Haffer 1960), in moist and dry valleys between 2100–3500 m in La Paz, Santa Cruz and Chuquisaca, Bolivia (Kempff 1985, Arribas et al. 1995) and from sea level to the puna in the western slope of the Peruvian Andes (Fjeldsa and Krabbe 1990). White-throated Hawks have been observed in northwestern Argentina, where they could be migratory (Olrog 1979) and during spring and summer in forests in southern Argentina (Casas and Gelain

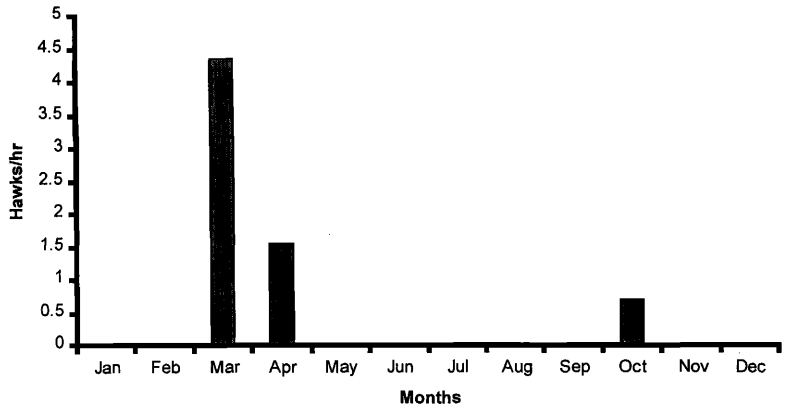

Figure 1. Monthly average of White-throated Hawks observed in migratory flight from San Carlos de Apoquindo and Farellones expressed as hawks observed per hr.

1995). In the southern extreme of its range, the White-throated Hawk uses forested areas in the Argentinean Andes (Olrog 1979), occupying the *Nothofagus* woods in the Neuquén, Río Negro and Chubut Provinces (Navas and Manghi 1991, Casas and Gelain 1995). In Chile, it is considered resident between the Los Lagos and Atacama administrative regions (Goodall et al. 1957). Considering how little information is available on the White-throated Hawk, observations reported herein clarify the status of this species in Chile.

METHODS

I counted White-throated Hawks at two fixed points in two areas in central Chile (Clarck 1985). One point was on a high peak (1747 m) in a mountain range in San Carlos de Apoquindo, east of Santiago (33°24'S, 70°28'W). A total of 393.5 hr of observations were made from July 1987–October 1988 over 52 d (3.3 ± 1.7 d per mo, ±SD). The other observation point was located at a high peak (2120 m), 11 km east of San Carlos de Apoquindo in the area of Farellones (33°22'S, 70°21'W). A total of 236 hr of observations were made from April 1996–March 1998 over 26 d (2.2 ± 1.2 d per mo). Vegetation in both areas was Andean sclerophyllous scrub.

Observations were made from dawn to sunset and an observation day started when the first hawk was seen. Observations were made using 10 × 50 binoculars and I recorded the number of hawks observed per hr (Heintzelman 1986). To avoid variations in the flight patterns due to weather conditions (Haugh 1972, Alerstam 1978, Richardson 1978, Hussell 1985, Kerlinger 1989), hawks were counted only on clear days. The White-throated Hawk's small size, short tail, sharp wings and color pattern made it easily distinguishable from other similar-looking hawks, such the Red-backed Hawk (*Buteo polyosoma*). In addition, from 1990–98, several observations were made of White-throated Hawks in different areas of Chile during various times of the year. When possible, the type of behavior shown (i.e., migration, breeding or stationary in one place) was recorded.

RESULTS

In San Carlos de Apoquindo and Farellones, a total of 291 White-throated Hawks was observed. All showed long and fast, unidirectional flapping flight until they disappeared from sight, which I interpreted as migratory flight. None of the hawks interrupted their flights to perch. In San Carlos de Apoquindo, 35 White-throated Hawks were observed in north to south flight. Nine and 26 of these were recorded in October 1987 and October 1988, respectively. Regular monitoring continued during the rest of the year, even when no hawks were observed. This represented a monthly frequency of 0.7 hawks/hr for October of both years (Fig. 1). The earliest record was made on 2 October 1988 and the latest was made on 9 October 1988, the beginning of austral spring.

In Farellones, 256 hawks were recorded in south to north flight. Of these, 90% were observed during March and 10% during April, representing a frequency of 4.3 hawks/hr for March and 1.6 for April. The earliest observation was made on 21 March 1998 and the latest was made on 4 April 1996, the beginning of the austral fall. Regular monitoring continued even when no hawks were observed (Fig. 1).

Flights in Farellones were recorded between 1000 H and 1800 H. There was no hourly pattern but the hawks showed a tendency to fly in groups. Of the 87 hawks recorded on 21 March 1998, 93% flew in flocks of two, eight and 71 hawks; of the

Table 1. Observations of White-throated Hawks in several areas of Chile from 1990–98.

DATE	AREA	LATITUDE (S)	LONGITUDE (W)	HAWKS OBSERVED	ADULTS	IMMATURES	ACTIVITY[a]
5 Jan 98	Río Teno	35°00′	70°45′	1			St
7 Jan 98	Río Teno	35°00′	70°45′	1			St
9 Feb 91	Conguillío	38°40′	71°45′	2	2		B
14 Feb 92	Villarica	38°40′	72°00′	2	2		B
3 Mar 98	Petrohue	41°10′	72°25′	1			St
4 Apr 98	Ñuble	37°55′	71°30′	4			S→N
5 Apr 98	Ñuble	37°00′	71°30′	3			S→N
6 Apr 98	Ñuble	37°00′	71°30′	2			S→N
11 May 97	Calama	22°30′	69°00′	1			S→N
26 Sep 90	Cordillera de Santiago	33°25′	70°30′	1	1		N→S
29 Sep 97	Co. El Roble	33°00′	71°05′	1			St
6 Oct 97	Chacabuco	33°00′	70°40′	7	5	2	N→S
20 Oct 97	Río Teno	35°00′	70°45′	1			St
22 Oct 97	Río Teno	35°00′	70°45′	5			St
24 Oct 97	Río Teno	35°00′	70°45′	1			St
17 Nov 96	Conguillío	38°40′	71°40′	2	1		B
Total				35	11	2	

[a] St—stationary, B—breeding, S→N—migratory flight from south to north, N→S—migratory flight from north to south.

130 hawks recorded on 23 March 1997, 95% were recorded in 19 flocks with an average of 6.5 ± 7.3 (±SD, range = 2–32) hawks per flock. Of 14 hawks recorded on 27 March 1998, 12 formed part of one flock. From 1990–98, a total of 35 White-throated Hawks were observed in 10 areas between Calama (22°30′S) and Petrohue (41°10′S) either migrating, breeding or stationary (Table 1). Ten hawks were recorded migrating from south to north between 4 April–11 May and eight hawks migrated from north to south between 26 September–6 October. These movements were observed in five areas between 22–37°S, including areas ranging from Andean desert, high Andean steppe, native scrub, natural forest and urban areas.

Six breeding White-throated Hawks were recorded on two occasions in Conguillío National Park and on one occasion in the Villarrica National Park between 38–39°S. They were in mature native *Nothofagus dombeyi* forests.

Eleven stationary hawks were recorded in three mountainous areas with native forests between 33–41°S either hunting and/or perching on trees. Two percent of the hawks observed on migration at San Carlos de Apoquindo and Farellones and 69% of the stationary hawks were observed hunting insects while in flight. On only one occasion was a hawk observed carrying a rodent to its nest showing a tendency for White-throated Hawks to eat insects.

DISCUSSION

With the exception of one hawk observed in migratory flight in May, the 326 hawks recorded in this study were observed between 26 September–6 April, the warm period of the year. These records included hawks migrating from north to south between 26 September–9 October, breeding hawks between 29 September–21 March and hawks migrating from south to north between 21 March–6 April.

My results were similar to those of Olrog (1979) and Casas and Gelain (1995) who also observed White-throated Hawks between September and March in *Nothofagus* forests in Neuquén, Río Negro and Chubut Provinces in Argentina (40–43°S). With only one exception, all of the 300 observations I made north of 35°S were of migrating hawks and none was associated with forests. The exception was a hawk observed perched in September, probably resting during migration. Although no dates were reported for hawks observed in Venezuela (Phelps and de Schauensee 1978), Ecuador (Lehmann and Haffer 1960) and Bolivia (Kempff 1985, Arribas et al. 1995), these observations were probably of hawks that were wintering in tropical mountain forests, unless a fraction of the population is resident in equatorial areas (Newton 1979).

In Chile, Ospreys (*Pandion haliaetus*) and Pere-

grine Falcons (*Falco peregrinus*) are the only species of raptors considered to be interhemispheric migrants, both arriving as summer visitors that breed in the Northern Hemisphere. The White-throated Hawk would be the third long-range migratory raptor for Chile but, in contrast to the others, it reproduces in the southern range of its distribution.

October to February (warm season) is the period with the highest availability of insects in *Nothofagus* forests for White-throated Hawks, and June and July are the months with the lowest insect availability. Hence, a reason for the migration of White-throated Hawks could be the lack of insects during the winter months. In fact, half of the bird species in southern temperate forests migrate completely or partially to the north or to the lowland forests during the winter season.

Hawks make soaring migratory flights along defined, but sometimes indirect routes associated with mountainous areas with updrafts and they restrict their flights to hours with thermal air currents (Newton 1979). The hourly flight movements observed in Farellones were irregular and occurred between 1000–1800 H. This timing corresponded with the presence of uplifting thermals. In San Carlos de Apoquindo, flights were recorded only from north to south and, in Farellones, only from south to north. This suggested that the hawks used different routes during their migration. Furthermore, more birds were observed flying north indicating that the southern San Carlos de Apoquindo route may be of secondary importance.

Given that the southern temperate forest of Chile appears to be an important breeding area for White-throated Hawks, I agree with Casas and Gelain (1995) that the main threat for this species is the rapid removal of these forests by people. Since 1974, the destruction rate of southern temperate forest has increased dramatically (Lara et al. 1995). These impacts have significant consequences for the entire forest avifauna. Counts of raptors during migration provide a reliable census method (Spofford 1969, Hackman and Henny 1971, Nagy 1977, Dunne and Sutton 1986, Bednarz et al. 1990), and highlight long-term population changes (Leshem 1994). Therefore, intensive counts of White-throated Hawks from predetermined points in central Chile during spring and fall will further document the current status of this little-known raptor.

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