

Conservation Status and Knowledge of Raptor Migration in Bolivia

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ABSTRACT – Bolivia has 68 species of diurnal raptors, 40 of which are believed to migrate at least in part of their range. Only one species of migrating raptors, the Harpy Eagle, an irruptive migrant, is listed in the Red Data Book of Vertebrates of Bolivia as an endangered species. Bolivia has seven *Hawks Aloft World-wide* raptor migration watchsites identified to date in South America, with more than 54,500 migrating raptors counted. Raptor migration in Bolivia has been poorly studied, and most of the data come from non-systematic research. In this article I review the conservation status of migrating raptors, migration knowledge and timing for the species with the most complete data in Bolivia, and I compare these data with data from bordering countries.

INTRODUCTION

There are 99 species of diurnal raptors in the Western Hemisphere, 40 of which are complete or partial migrants. An additional 17 species are local or irruptive migrants (Zalles & Bildstein 2000).

Bolivia has one of the highest diversities of birds in the world, due to the variety of its ecological regions. The number of bird species recorded to date are 1358, 43% of all bird species in South America (Arribas et al., 1995). Bolivia has 68 species of diurnal raptors, 40 of which are believed to migrate in at least part of their range (Zalles & Bildstein 2000).

With seven of 34 *Hawks Aloft World-wide* raptor migration watchsites identified to date in South America, Central America, the Caribbean and Mexico, Bolivia has the highest number of watchsites of any country in the region; Bolivia is also a cross-roads for Nearctic, Intratropical and Austral migrants (Zalles & Bildstein 2000), so the country may have one of the greatest potentials for raptor migration research in the continent.

However, observations at these watchsites have been non-systematic and sporadic, and there has been no scientific study on raptor migration in Bolivia. Even so there are more than 54,500 birds of prey reported for the seven watchsites, the highest hawk migration counts in all South America.

STUDY AREA

There are seven *Hawks Aloft World-wide* raptor migration watchsites (Fig. 1) located in Bolivia (Zalles & Bildstein 2000):

- **Riberaita**, a small town in a river-valley at the confluence of the Beni and Madre de Dios rivers.
- **Hacienda Santa Rosa**, a river-valley watchsite, 8 km from the Madre de Dios river, with extensive oxbow lakes.
- **Concepción**, a lowland watchsite at the western edge of the Brazilian Shield, with a hilly topography, covered with semideciduous forest and wooded savannah.
- **Viru-Viru**, a lowland watchsite at the Viru-Viru International Airport, north of the city of Santa Cruz.
- **Parque Regional Lomas de Arena**, a sand dune lowland with shallow lagoons in the foothills of the eastern Cordillera of the Andes.

- **Jardín Botánico de Santa Cruz**, a lowland watchsite east of Santa Cruz, 75 km east of the Andean foothills.
- **Masicuri**, a mountain watchsite in the foothills of the eastern Cordillera of the Andes.

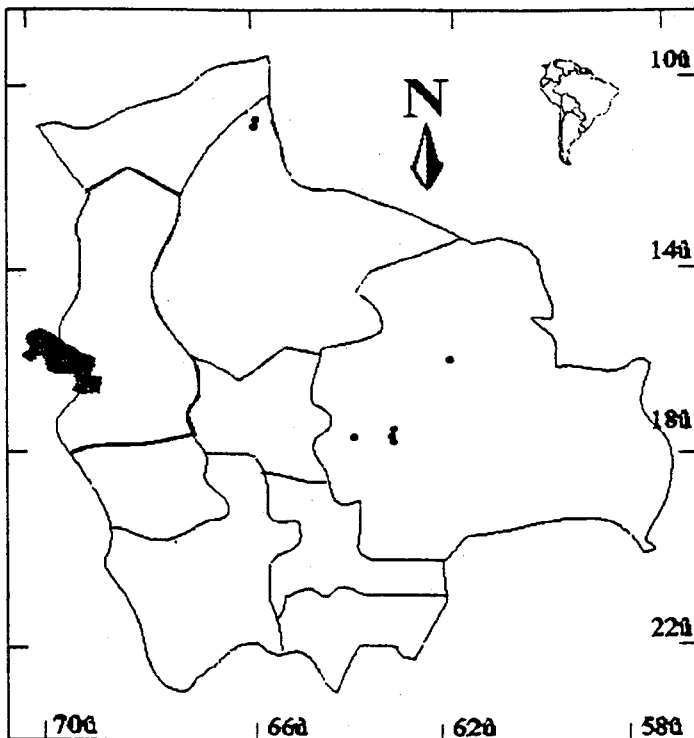


Figure 1. *Hawks Aloft* World-wide raptor migration watchsites in Bolivia (Zalles & Bildstein 2000)

METHODS

I conducted a literature review of the species of Nearctic, Intratropical and Austral raptors that pass through Bolivia during the fall migration, and of those, which spend the winter in Bolivia as well. All the reports or published accounts that were available were reviewed, and each citation pursued. This process was repeated until I could assemble most of the small number of articles concerning raptor migration in Bolivia and bordering countries.

Data on timing of migration were derived for six species, the dates for Bolivia being taken from Davis (1989, 1993) and from Zalles and Bildstein (2000). Also approximate dates for some species for which no data were available for Bolivia were taken from dates reported for bordering countries.

RESULTS AND DISCUSSION

For sites combined, the four most abundant (of 15) species recorded at Bolivian hawk watchsites are: Snail Kite (*Rostrhamus sociabilis*) 30,000, Swainson's Hawk (*Buteo swainsoni*) 10,000-13,000, Swallow-tailed Kite (*Elanoides forficatus*) 10,000, and Plumbeous Kite (*Ictinia plumbea*), and Mississippi Kite (*Ictinia mississippiensis*) 1,000-1,500 for both species.

So far, there have been 54,500 migrating birds of prey reported for the seven raptor migration watchsites, the highest hawk migration counts in all South America (Zalles and Bildstein, 2000) Bolivia has 139 threatened species cited in the Red Book of Vertebrates of Bolivia (Ergueta y

Morales, 1996), four of which are raptors: *Harpyhaliaetus coronatus*, *Morphnus guianensis*, *Harpia harpyja* and *Oroaetus isidori*.

Only one irruptive migrant species, the Harpy Eagle, is listed by Ergueta and Morales (1996), this species being, considered as "near threatened" in the Threatened Birds of the Americas, The ICBP/IUCN Red Data Book (Collar et al. 1992), and included in Appendix I of CITES (CITES, 1995). The populations of the Harpy Eagle are decreasing due to habitat destruction and hunting for sport (Ergueta y Morales 1996). None of the other migratory species is threatened, but further data on these species are needed.

Intensive and rapid destruction of habitat is the major cause of the decrease of populations of threatened species in Bolivia; also sporting and illegal hunting and illegal commerce are other threats, which negatively affect these populations to a lesser degree (Ergueta y Morales, 1996).

Osprey (*Pandion haliaetus*)

The Osprey is a completely Nearctic migrant in the tropics (Bildstein & Zalles, 1998). It breeds in North America, but there are resident populations in Central and North America (Rappole et al., 1993). Its migration is relatively well known due to satellite tracking studies. There are reports for five birds wintering in Bolivia, in the area of Bella Vista, NE, NW of Santa Cruz, SE of La Paz, and northern Bolivia. Fall migration was first recorded on August 17th, with records through September and October. The spring migration appears to begin in January and finish in March, when there are no records of telemetered Ospreys in Bolivia (Martell, pers. comm.).

In Peru, there is a record from Lake Titicaca, near the Bolivian border on October 16, and another report from Lake Junín (Hughes, 1988), according to which data Ospreys may enter the high Andes fairly regularly. In Paraguay, the migration of Ospreys may start earlier than in the high Andes, as from 22-26 August four birds were recorded there, extending to a late migration on November 15 (Hayes et al., 1990).

Mississippi Kite (*Ictinia mississippiensis*)

The Mississippi Kite is a completely Nearctic migrant (Bildstein & Zalles 1998). It breeds in southern North America and Central America, and some parts of South America (Bolen & Flores 1993; Rappole et al. 1993). Its migration is relatively well documented in Bolivia (Davis, 1989, 1993). It has been recorded from 25 August (Fig. 2), with small numbers of migrating kites until 18 September; after this date flocks of 300-500 kites have been reported in Concepcion, where the peak of migration seems to be between 5 October and 5 November, when 1,000-1,500 kites were recorded. The last records are on November 25th (Davis, 1989). The Mississippi Kite migrates in flocks with the Plumbeous Kite (Davis 1989).

Plumbeous Kite (*Ictinia plumbea*)

The Plumbeous Kite (Fig. 2) is a partial Nearctic migrant, and also a tropical resident (Bildstein & Zalles 1998). It breeds in Central and South America (Eisenmann 1963). It was recorded in Bolivia on the same dates as the Mississippi Kite, hence its migration is relatively well known (Davis, 1989). In Paraguay, the species was recorded on August 27th (Hayes et al., 1994), and migrating birds reach Argentina around late September (Brown & Amadon 1989; Eisenmann 1963).

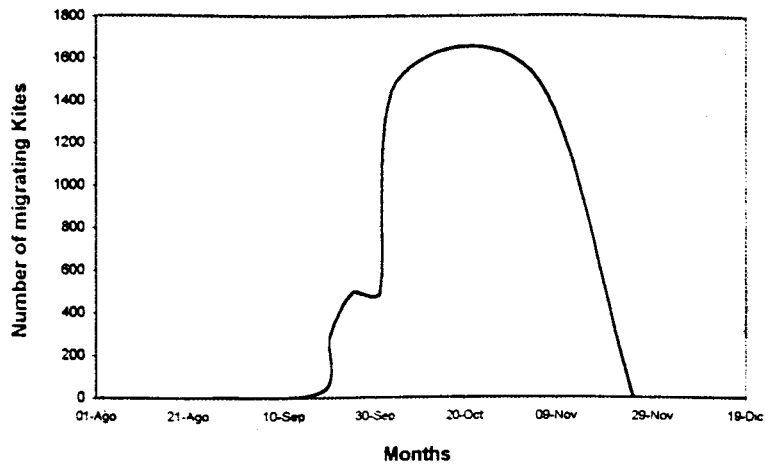


Figure 2. Fall migration timing of the Mississippi and Plumbeous Kites in Bolivia for the years 1985-86 (Davis 1989).

Snail Kite (*Rostrhamus sociabilis*)

The Snail Kite is a partial Nearctic and Austral migrant, and a tropical resident (Bildstein & Zalles 1998). It breeds in Central, North and South America (Brown & Amadon 1989). Its migration is relatively well known, through anecdotal observations. There are no data that indicate the beginning of the migration in Bolivia, but it seems that the peak is between 10 and 12 November (Fig. 3), when 30,000 birds were recorded at the Viru-Viru International Airport (Zalles & Bildstein 2000). The number of migrating kites decreases about November 24th, with only 250 kites reported. In the Brazilian Pantanal, near the Bolivian border, flocks of 40-80 were reported in late October (de Tarso Zuquim, 1994). It appears that the fall migration is short for this species. The peak of spring migration may be near February 10th, when 20,000 kites were reported (Zalles & Bildstein 2000).

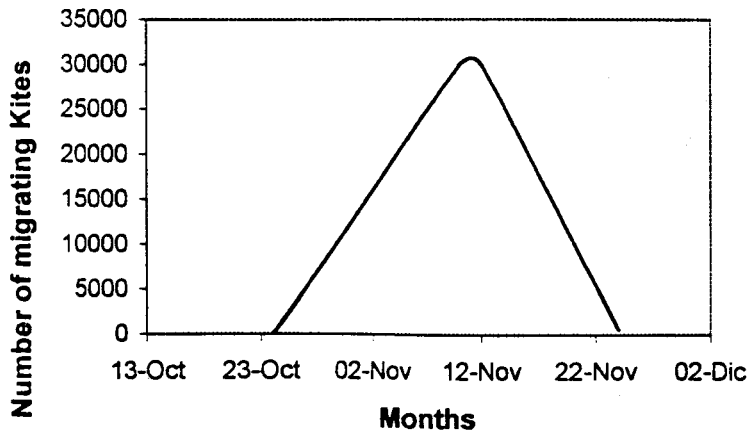


Figure 3. Fall migration timing for the Snail Kite in Bolivia, for the years 1992 and 1994 (Zalles & Bildstein 2000), and data extrapolated from de Tarso Zuquim (1994).

Swallow-tailed Kite (*Elanoides forficatus*)

The Swallow-tailed Kite is a partial Nearctic and Austral migrant, and a tropical resident (Bildstein & Zalles, 1998). It breeds in Central and South America, and parts of North America (Rappole et al., 1993). Its migration is relatively poorly known with only anecdotal and non-

systematic observations. There are no data in Bolivia on the beginning and end of migration, but this might start on a similar date as in Paraguay. Kites were migrating in Paraguay on August 24th (Hayes et al., 1990) and the peak of migration in Bolivia may be on November 8th, when 1,000 kites were recorded at the Hacienda Santa Rosa watchsite (Zalles & Bildstein, 2000). Data from satellite telemetry (Meyer et al., 1997) show that Swallow-tailed Kites have large communal roosts in Brazil, with 300 to 1,400 birds.

Rufous-thighed Kite (*Harpagus diodon*)

The Rufous-thighed Kite is an Intratropical migrant (Bildstein & Zalles, 1998). It breeds in Central and South America (Brown & Amadon, 1989). It has been recorded between August 29 and October 15 and between January 5 and February 2 in Paraguay (Hayes et al., 1994). No records are available for Bolivia.

Great Black Hawk (*Buteogallus urubitinga*)

The Great Black Hawk is an Intratropical migrant (Bildstein & Zalles, 1998). It breeds in Central and South America (Brown & Amadon, 1989). Its migration is relatively poorly known with anecdotal and non-systematic observations only (Fig. 4). In Bolivia it was first recorded on September 8th, when a flock of 35 birds was reported in Concepción (Davis, 1993), and apparently reached a peak around September 25th, with a flock of 150 birds. The latest date of migration recorded was November 26th, when the last 11 kites were reported.

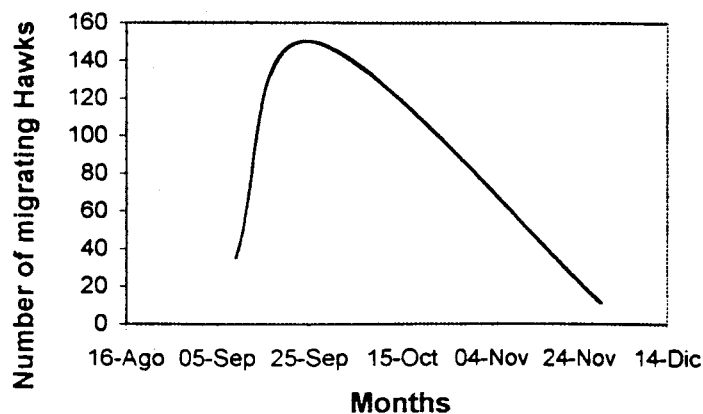


Figure 4. Fall migration timing for the Great-Black Hawk in Bolivia, for the years 1985 and 1986 (Davis 1993, Zalles & Bildstein 2000).

Swainson's Hawk (*Buteo swainsoni*)

The Swainson's Hawk is a completely Nearctic migrant (Bildstein & Zalles, 1998). It breeds in North America and winters in Central and South America (Rappole et al., 1993). Its migration is relatively well known in Bolivia due to satellite telemetry studies from the Raptor Research Centre at Boise State University in Idaho, and The Raptor Centre at the University of Minnesota in Montana.

Fall migration in Bolivia begins on September 31st, when satellite -tracked birds first reached the country, but most birds arrive during the first and second weeks of October (Martell, pers. comm.). During spring migration birds pass through Bolivia in March (Martell, pers. comm.).

In Paraguay migration begins in December 3rd and 13th (Hayes et al., 1990). In Argentina, migration starts in August (Fjeldsá and Krabbe, 1990). For the spring migration, the first migrant in Paraguay was on February 25th (Hayes et al., 1990), and the migration peak for Bolivia (Fig.

5) appears to be around March 12th, when 10,000–13,000 birds were recorded in Masicuri. In Argentina the fall migration peak appears to be around November 23th, with 5,000 birds (Zalles & Bildstein, 2000). According to the data of Fuller et al. (1998), Swainson's Hawk migration is concentrated in a funnel shape during southward migration over South America, so Masicuri probably forms only part of the migration route.

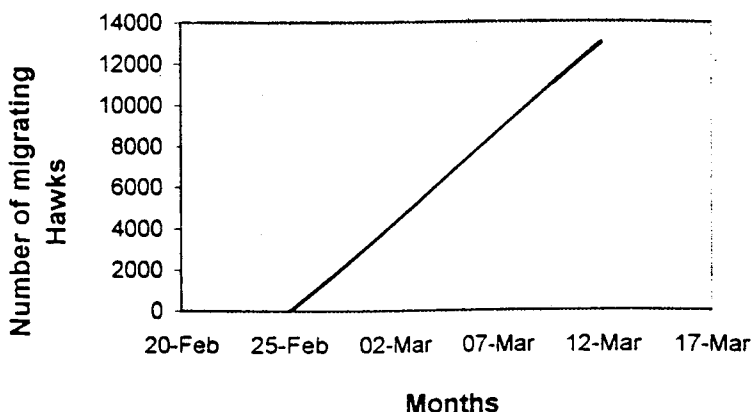


Figure 5. Fall migration timing for the Swainson's Hawk in Bolivia, for the years 1989 and 1993 (Zalles & Bildstein 2000).

Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon is a partial Nearctic and Austral migrant (Bildstein & Zalles 1998). It breeds in North and South America, wintering in Central, North and South America, with resident populations in the three continents (Rappole et al. 1993). Its migration is relatively well known in Bolivia due to studies with satellite telemetry from the Raptor Research Center at Boise State University in Idaho.

There are two records in Bolivia of migrating individuals, on December 20th and April 27th, in the city of Cochabamba (Dott 1985). In Paraguay a migrating Peregrine was reported on October 13th (Hayes et al. 1990). There are also two records from Lake Titicaca in the Andean plateau, in Peru, near the Bolivian border on October 16th and November 17th (Hughes, 1988). These records may be extended to Bolivia as well, and may represent only small numbers of the Peregrine Falcons migrating through this area. Data collected from 57 Peregrines with PTT's suggest that individuals from North America migrate in a broad front over South America, and that their migration is dispersed (Fuller et al. 1998).

CONCLUSIONS

Relatively little is known about raptor migration in Bolivia. Most reports are anecdotal and were collected with non-systematic research. Other hawk watchsites, as of yet undescribed, might be important areas for bird migration, perhaps with greater numbers of migrants. In Bolivia habitat destruction by increasing human populations, and agriculture, timber harvesting and cattle ranching is increasing. Further studies on migration routes are needed, in order to find and protect the key areas for migratory birds.

Further studies of the migration ecology of the 40 migrating species of Bolivia, are also needed. With a greater knowledge, we will learn not only about raptor migration patterns and routes, migration behaviour, and ecology, but also document key conservation areas for these species and implement long-term conservation and management plans.

Habitat destruction or modification is the greatest threat to both migratory and resident raptors in Bolivia. Due to this and also to hunting, populations of some raptor species are decreasing.

ACKNOWLEDGEMENTS

Many thanks to Keith Bildstein for his help, support and for reviewing the manuscript. To Laune Goodrich for her support and for reviewing the manuscript. To Jennifer Ottinger for her help with the map. To the people at Hawk Mountain, many thanks for the marvellous experience and their inspiration to my further work on raptor conservation.

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NEWSLETTER

**of the World Working Group
on Birds of Prey and Owls (WWGBP)**

No. 29 / 32

