

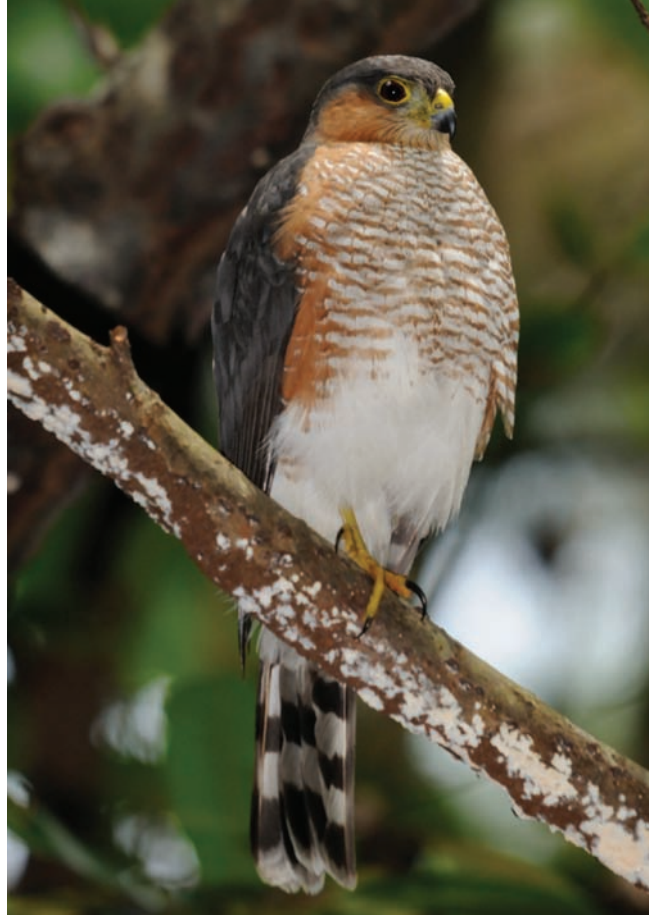
# Where to watch raptor migration in the Caribbean

**Matias A. Juhant**

Following our two previous investigations into raptor migration over Middle America and South America, Matias Juhant takes us on a tour across the Caribbean in search of migrant birds of prey. Although this region is more frequently associated with its many endemics (among them several restricted-range raptors, at least two of them on the verge of extinction), as the author reveals, raptors also move through and to the West Indian islands. As in other parts of the Neotropics, our cumulative knowledge of their routes, stopover sites and final destinations are sometimes poorly known, and efforts to better understand them can be substantially advanced by amateur observations.

Cuban Black Hawk *Buteogallus gundlachii*, Cayo Coco, Archipiélago de Sabana-Camagüey, Cuba, March 2008 (William Price / [www.pbase.com/tereksandpiper](http://www.pbase.com/tereksandpiper)). Cuban Black Hawk is one of four raptors endemic to the Greater Antilles. It is distributed locally across the main island, the Isle of Youth, and on many of the keys off both the north and south coasts.





Sharp-shinned Hawks *Accipiter striatus venator*, juvenile (at right) and adult (left), Maricao State Forest, Puerto Rico, June 2009 and 2011 (Mike Morel / [www.mikemorelphotography.zenfolio.com](http://www.mikemorelphotography.zenfolio.com)). *A. s. venator* is endemic to Puerto Rico, while two additional subspecies *A. s. fringilloides* and *A. s. striatus* occur solely in Cuba and on Hispaniola, respectively. A total of four subspecies, including the North American migrant *A. s. velox*, occur in the Caribbean.

**R**aptor migration in the Caribbean was first observed as long ago as the early 16th century by the Spanish historian Gonzalo Fernández de Oviedo y Valdés. He described large-scale movements of raptors in the Greater Antilles (and Middle America): ‘...every year there pass from the end of Cuba infinite numbers of divers sorts of birds [raptors], which come from the North of the firme Land, and crosse over the Alacrain Islands [the Alacranes] and Cuba, and flye over the Gulfe Southwards...’<sup>3</sup>. Several centuries later Hoffman & Darrow<sup>20</sup> wrote the first complete overview of raptor migration in the Caribbean and provided an account of 17 species that migrate across the West Indies. Subsequently, Zalles & Bildstein<sup>57</sup> synthesised knowledge of raptor migration in the Neotropics including a short description of raptor migration in the Caribbean, and proposed five potential watchsites for long-term monitoring in the Florida Keys, Cuba and the Archipiélago de Los Roques. Despite these efforts, we still lack long-term or detailed data from raptor

watchsites, information on the main wintering areas of the species involved, their bottlenecks, and details of their migration routes across the Caribbean. In this article, I examine the state of our current knowledge of raptor migration in the Caribbean, with an emphasis on Caribbean flyways, water-crossing behaviour and weather conditions, and describe 11 sites to watch raptors on migration throughout the Caribbean Basin, including the Florida Keys, the Greater Antilles and the islands off the northern coast of South America.

## Caribbean flyways

The Caribbean migration system is populated by Nearctic–Neotropical migrants and includes species that breed in the North America and overwinter in the Neotropics. Based on satellite-tracking data, banding recoveries, raptor migration counts and sporadic observations, I propose to divide the Caribbean into six raptor migration corridors.

(1) *From the Florida Keys through the western Greater Antilles to Middle America.*—This corridor involves two over-water crossings totalling 350 km, from Key West to northern Cuba (155 km) and from westernmost Cuba to the Yucatán Peninsula (195 km). Satellite-tracking data reveal that Swallow-tailed Kites *Elanoides forficatus* and Peregrine Falcons *Falco peregrinus* pass through peninsular Florida, cross into Cuba and then move west to the Yucatán into Middle America and onwards towards South America<sup>16,17,58</sup> ([www.frg.org/SC\\_PEFA.htm](http://www.frg.org/SC_PEFA.htm)). There are no satellite-tracking data for any Ospreys *Pandion haliaetus* migrating via this corridor, but at Cabo San Antonio (at the westernmost tip of Cuba), 71 Ospreys have been counted presumably en route to Middle America<sup>40</sup>. Cabo San Antonio represents one of the largest bottlenecks for Swallow-tailed Kites in the Northern Hemisphere, where 2,950 kites were counted between mid July and early October 2007<sup>40</sup>. Tracked kites arrived on the Yucatán Peninsula as early as 19 July and as late as 7 September<sup>58</sup>. Swallow-tailed Kites have also been observed in eastern Cuba, where as many as 67 have been recorded, while two have even been seen in Haiti<sup>5,10</sup>. However, the paucity of data for eastern Cuba, Hispaniola, Jamaica and the Cayman Islands suggests that records in these areas involved either vagrants or wintering birds<sup>39</sup>. Peregrine Falcon migration via this corridor in autumn is linked to tail-winds and updrafts that assist its migration, but during spring the birds must ‘make do’ without such favourable weather conditions and this appears to be the reason why no large movements of Peregrines across the Caribbean occur at this season<sup>16,17</sup> ([www.frg.org/SC\\_PEFA.htm](http://www.frg.org/SC_PEFA.htm)). Records of Mississippi Kites *Ictinia mississippiensis* over the Florida Keys and Greater Antilles include a mean 19 kites during ten autumn counts on the Florida Keys<sup>48</sup>, a single-season count of 272 at Cabo San Antonio, Cuba, between mid July and early October<sup>40</sup>, a single record of two on 2 October 2002 from the Cayman Islands<sup>36</sup>, and four records of small groups or single birds during spring between mid March and mid May in Jamaica, elsewhere in Cuba, and on Bermuda<sup>8,25,31,55</sup>, may indicate that this species uses the corridor in small numbers. Other species, such as Sharp-shinned Hawk *Accipiter striatus*, Broad-winged Hawk *Buteo platypterus*, Swainson’s Hawk *B. swainsoni*, American Kestrel *Falco sparverius* and Merlin *Falco columbarius* might also be using this migration corridor but published data are still rather few and poorly documented<sup>1,7,20,40,47</sup>.

(2) *From the Florida Keys through the eastern Greater Antilles to South America.*—This corridor

includes total over-water crossings of 905 km; from Key West to northern Cuba (155 km), from eastern Cuba to Hispaniola (150 km), and from Hispaniola to northern South America (600 km). East coast and upper Midwestern Ospreys migrate overland via the length of peninsular Florida, thereafter into north-central Cuba via Matanzas and Villa Clara provinces towards Hispaniola and thereafter cross the Caribbean to northern South America making landfall between Barranquilla (Colombia) and the Lago de Maracaibo (Venezuela)<sup>29,30</sup>. Data from band recoveries and tracked Ospreys suggest that Cuba and Hispaniola serve as major stopover sites for mainland Ospreys migrating via this corridor<sup>29,30,40,45</sup>. Peregrine Falcon also uses this corridor in a similar way to Ospreys, but on returning to their breeding areas use the Mesoamerican Land Corridor in spring<sup>16,21</sup>.

(3) *From the Florida Keys through the Greater and Lesser Antilles to South America.*—This corridor includes total over-water crossings of 1,160 km. No satellite-tracking data or raptor migration counts are available from this corridor. Tracked Ospreys from North America did not continue island-hopping through Puerto Rico and the smaller islands to the south-east<sup>29,30</sup>. Smaller falcons, such as American Kestrel and Merlin, may use this corridor en route to Venezuela, but further field research is needed to determine if this is the case.

(4) *From the Florida Keys to the West Indies.*—This corridor includes total over-water crossings of between 155 and 1,000 km depending on the birds’ wintering grounds in the West Indies. Most raptors that over-winter in the West Indies remain in the Greater Antilles, with the numbers of wintering birds decreasing southward through Lesser Antilles and the islands off the north coast of South America<sup>39</sup>. Several authors have recorded movements of Turkey Vultures *Cathartes aura* within the keys, peaking between late October and early December<sup>11,20,28,34</sup>. Doubts existed as to whether this vulture crosses the Straits of Florida to the West Indies, but two vultures marked in Florida have been observed near La Habana (Cuba)<sup>56</sup> and Raffaele *et al.*<sup>39</sup> also reported that numbers of Turkey Vultures apparently increase in the Bahamas and Cuba during winter, suggesting that small numbers overwinter in the Greater Antilles. Black Vulture *Coragyps atratus* is considered a vagrant to the West Indies by Raffaele *et al.*<sup>39</sup> and has been recorded from the Bahamas (Bimini), Cuba, Jamaica and Grenada, on the last island probably from a South American population. In the Florida Keys, Black Vultures have been recorded once on migration (two

Table 1. Raptor species that migrate across the Caribbean. Regular migrants (RM), vagrants (V) and uncertain status (?). Migration pathways: <sup>1</sup>from the Florida Keys through the western Greater Antilles to Middle America; <sup>2</sup>from the Florida Keys through the eastern Greater Antilles to South America; <sup>3</sup>from the Florida Keys through the Greater and Lesser Antilles to South America; <sup>4</sup>from the Florida Keys to the West Indies; <sup>5</sup>through the Gulf of Mexico to the Yucatán Peninsula; <sup>6</sup>transatlantic vagrants, and <sup>7</sup>breed in the Caribbean.

|   | Florida Keys | The Bahamas | Greater Antilles | Lesser Antilles |
|---|--------------|-------------|------------------|-----------------|
| <b>Complete migrants</b>  |              |             |                  |                 |
| Osprey <i>Pandion haliaetus</i> <sup>1,2,37,4,5,7</sup>           | RM           | RM          | RM               | RM              |
| Mississippi Kite <i>Ictinia mississippiensis</i> <sup>17,4?</sup> | RM           | V           | ?                | -               |
| Broad-winged Hawk <i>Buteo platypterus</i> <sup>17,37,4,7</sup>   | RM           | -           | RM               | V               |
| Swainson's Hawk <i>B. swainsoni</i> <sup>17,37,4?</sup>           | RM           | -           | ?                | V               |
| <b>Partial migrants</b>   |              |             |                  |                 |
| Turkey Vulture <i>Cathartes aura</i> <sup>47,7</sup>              | ?            | ?           | ?                | -               |
| Black Vulture <i>Coragyps atratus</i> <sup>47</sup>               | ?            | ?           | ?                | -               |
| Swallow-tailed Kite <i>Elanoides forficatus</i> <sup>1,47,7</sup> | RM           | V           | RM               | V               |
| Black Kite <i>Milvus migrans</i> <sup>6</sup>                     | -            | -           | -                | V               |
| Bald Eagle <i>Haliaeetus leucocephalus</i> <sup>47</sup>          | ?            | ?           | V                | -               |
| Western Marsh Harrier <i>Circus aeruginosus</i> <sup>6</sup>      | -            | -           | V                | V               |
| Northern Harrier <i>C. cyaneus</i> <sup>17,4</sup>                | RM           | RM          | RM               | RM              |
| Sharp-shinned Hawk <i>Accipiter striatus</i> <sup>17,4,7</sup>    | RM           | RM          | RM               | ?               |
| Cooper's Hawk <i>A. cooperii</i> <sup>47</sup>                    | RM           | -           | ?                | -               |
| Red-shouldered Hawk <i>Buteo lineatus</i> <sup>47</sup>           | ?            | -           | ?                | -               |
| Short-tailed Hawk <i>B. brachyurus</i> <sup>47</sup>              | ?            | -           | ?                | -               |
| Red-tailed Hawk <i>B. jamaicensis</i> <sup>47,7</sup>             | ?            | -           | ?                | -               |
| Eurasian Kestrel <i>Falco tinnunculus</i> <sup>6</sup>            | -            | -           | -                | V               |
| American Kestrel <i>F. sparverius</i> <sup>17,37,4,7</sup>        | RM           | RM          | RM               | ?               |
| Merlin <i>F. columbarius</i> <sup>17,37,4</sup>                   | RM           | RM          | RM               | ?               |
| Peregrine Falcon <i>F. peregrinus</i> <sup>1,2,37,4,5,7</sup>     | RM           | RM          | RM               | RM              |
| Totals  | 17           | 11          | 18               | 12              |

birds)<sup>28</sup> and have overwintered there<sup>20</sup>. Most records from the Greater Antilles are dated between December and April<sup>13,49</sup>, which may indicate that small numbers overwinter there; for example, it seems that very small numbers winter around the Zapata Swamp, Cuba (G. M. Kirwan *in litt.* 2012). Osprey overwinters throughout the West Indies between September and April<sup>39</sup>. Northern Harrier *Circus cyaneus* overwinters in the Greater Antilles and Bahamas, is a rare migrant to the Lesser Antilles, and occurs in the region between October and April<sup>39</sup>. Most Sharp-shinned Hawks from North America overwinter in the Bahamas between February and April, while small numbers overwinter further south, in the Greater Antilles<sup>39</sup>. Cooper's Hawks *A. cooperii* have been observed (but not documented) at Cabo San Antonio between mid August and mid September, while two reported specimens also from Cuba

further suggest that some individuals reach the country<sup>40</sup>. Cooper's Hawk could potentially occur elsewhere throughout the Greater Antilles. Broad-winged (especially) and perhaps Swainson's Hawks seem to overwinter throughout the West Indies as far south as Trinidad & Tobago, but published data are still rather few and not well documented<sup>2,12,15,18,19,40,44</sup> (Southeastern Caribbean Bird Alert 2001-13/2002-43/2006-3, [www.ttfnc.org/rarebird.php](http://www.ttfnc.org/rarebird.php)). Short-tailed Hawks *B. brachyurus* have been recorded on migration as far south as the Florida Keys<sup>28,37,57</sup> and two were seen over Cabo San Antonio in autumn 2007, which indicates that the species might be an occasional winter visitor to Cuba<sup>40</sup>. Red-tailed Hawks *B. jamaicensis* from North America perhaps reach the West Indies in small numbers given that one ringed in New Jersey was recovered in the Dominican Republic<sup>23</sup>. Merlin overwinters



throughout the West Indies between October and March<sup>9,39</sup>, and Peregrine Falcon between October and April<sup>39</sup>.

(5) *Through the Gulf of Mexico to the Yucatán Peninsula.*—This corridor includes an over-water crossing of 850 km. Upper Midwestern Ospreys migrate south through the Mississippi drainage, cross the Gulf of Mexico directly towards the Yucatán Peninsula and thereafter move through Middle America towards South America<sup>29,50</sup>. On their return north in spring they cross the Gulf of Mexico from the Yucatán and make landfall on the Texas coast<sup>50</sup>. Peregrine Falcons breeding in the boreal forest region and low Arctic cross the Gulf of Mexico on their southbound migration, but rarely cross it on northbound passage<sup>16</sup>.

(6) *Transatlantic vagrants.*—Some migratory raptors have crossed the North Atlantic to the West Indies by natural dispersion, but presumably with assistance from prevailing westerly trade winds or via ship-assisted passage. Black Kite *Milvus migrans*, Western Marsh Harrier *C. aeruginosus* and Eurasian Kestrel *F. tinnunculus* have been recorded as vagrants on several islands in the West Indies<sup>24,26,33,36,38</sup>. In their natural range,

all of these species are to some extent long-distance migrants between Europe and Africa<sup>14</sup>.

## Water-crossing behaviour and weather conditions

The Gulf of Mexico and the Caribbean Sea present significant 'obstacles' for North American raptors that migrate through this region towards their wintering grounds. Darrow<sup>11</sup> wrote, with an emphasis on soaring raptors, that 'what happens to the birds once they leave Key West is something of an enigma, many people do not believe they cross the Straits of Florida...' (p. 38). Today, some data are available to resolve this issue, but we still have much to learn. Crossing these two large bodies of water, rather than following the Gulf coast is a trade-off between risk and total distance. Thermal and slope soaring are difficult to achieve over water, and only direct powered flight is particularly well suited for such travel, especially in tail-winds and cross-winds<sup>4</sup>. Limited information exists concerning how weather conditions affect the migration of raptors when they cross the Gulf of Mexico and Caribbean



Facing page: Copulating American Kestrels *Falco sparverius caribaeorum*, US Fish & Wildlife Refuge, Cabo Rojo, Puerto Rico, February 2012 (Mike Morel / [www.mikemorelphotography.zenfolio.com](http://www.mikemorelphotography.zenfolio.com)). This subspecies occurs in Puerto Rico, the Virgin Islands and the Lesser Antilles.

Below: Red-morph male American Kestrel *Falco sparverius sparveroides*, near the Guanahacabibes Peninsula, Pinar del Río province, Cuba, March 2008 (William Price / [www.pbase.com/tereksandpiper](http://www.pbase.com/tereksandpiper)). This polymorphic subspecies has two colour morphs of which the beautiful red morph occurs only in Cuba, but in the last 50 years this subspecies has extended its range south to Jamaica and north to the Bahamas.

At left: Adult male American Kestrel *Falco sparverius dominicensis*, Puerto Escondido, south-west Dominican Republic, March 2006 (Daphne Gemmill). A total of five subspecies of American Kestrels occur in the Caribbean. Those three depicted here are endemic to the Greater and Lesser Antilles, with the fourth, *F. s. brevipennis*, endemic to islands off the northern coast of South America, and finally *F. s. sparverius* is a North American migrant that occurs throughout the Caribbean basin in winter.



towards their wintering grounds, especially during tropical storms. Between 1871 and 2008, southern Florida was struck by 43 hurricanes at an average of one every three years, with the peak season mid August through most of October<sup>27</sup>, meaning that hurricane peaks clearly coincide with raptor migration. Hurricanes vary greatly in size and in the intensity of their winds, but they can affect bird populations both directly

and indirectly. Direct effects involve death from exposure to wind and rain, while indirect effects include destruction of food supplies or nesting, roosting and foraging substrates by high winds<sup>52</sup>. Satellite-tracking data revealed how tropical storms affected the orientation and navigation of an Osprey and two Peregrine Falcons crossing either the Gulf of Mexico or the Caribbean in poor weather conditions<sup>21,32,50</sup>. Holroyd & Duxbury<sup>21</sup> and McGrady *et al.*<sup>32</sup> tracked two Peregrine Falcons that encountered Hurricane Mitch on their southward migration across the West Indies. The Peregrine tracked by Holroyd & Duxbury<sup>21</sup> attempted to cross the Caribbean twice. During its first attempt, from Haiti to northern Venezuela, the Peregrine had to turn back north to Haiti when just 150 km from Venezuela due to strong winds from the south. On its second attempt, the bird changed its course further west towards Middle America, but apparently perished when it encountered head winds of up to c.160 km / hour. The Peregrine tracked by McGrady *et al.*<sup>32</sup> flew over Florida following the Keys when it met strong winds. It too then moved further west, perhaps perching on a ship, coming close to the

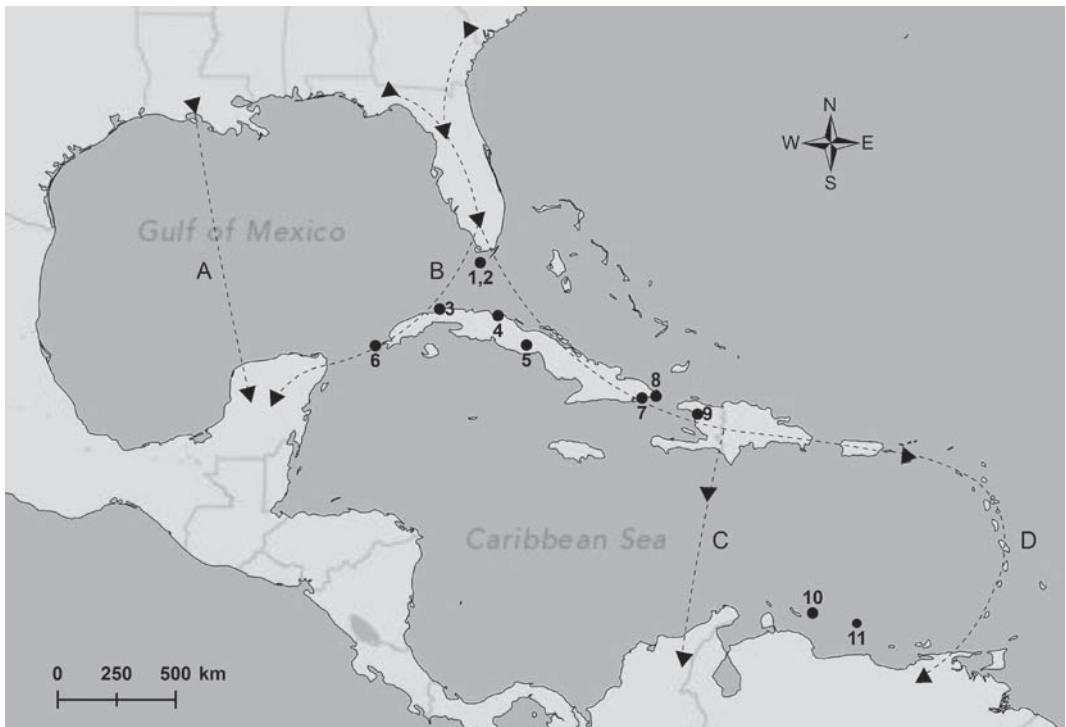


Figure 1. Migration routes and geographic locations of the 11 watchsites identified in the Caribbean. Migration pathways: (A) through the Gulf of Mexico to the Yucatán Peninsula; (B) from the Florida Keys through the western Greater Antilles to Middle America; (C) from the Florida Keys through the eastern Greater Antilles to South America and (D) from the Florida Keys through the Greater and Lesser Antilles to South America. Watchsites: (1–2) Florida Keys; (3–8) Cuba; (9) Haiti; (10) island of Bonaire and (11) Archipiélago de Los Roques.

Mexican coast and thereafter flew north to the Texas coast. It then continued its migration across the Gulf of Mexico towards Yucatán and further to northern Venezuela for the winter. Stout *et al.*<sup>50</sup> tracked an Osprey during its southbound migration from Louisiana and Texas to the Yucatán in four consecutive years. In the first two years, the Osprey crossed the Gulf of Mexico from Louisiana towards the Yucatán, but in the third year the bird moved 150 km further west perhaps because Hurricane Rita made landfall on the Texas–Louisiana border, and crossed the Gulf further south from the Texas coast. In the final year it followed the coast around the Gulf toward its wintering grounds. Perhaps this Osprey learned that crossing the Gulf of Mexico is risky? Also, Zimmerman<sup>58</sup> showed that the mortality rate of young Swallow-tailed Kites was higher for Florida kites, which migrate over water for between 350 km and 770 km, than for Louisiana kites, which migrate over land around the Gulf of Mexico. Study of the over-water migration of raptors and how tropical storms affect their migration through the Gulf of Mexico and the

Caribbean remains fertile ground for future research.

## Migration watchsites

Raptor migration has been observed at 11 watchsites in the Caribbean (Fig. 1). The watchsites can be divided into three areas: Florida Keys, the Bahamas and Greater Antilles, and the Lesser Antilles and the islands off the north coast of South America.

*Florida Keys.*—Two watchsites possess detailed data on raptor migration. Sixteen species have been recorded at these including Turkey Vulture, Osprey, two kites, Northern Harrier, Bald Eagle *Haliaeetus leucocephalus*, seven hawks and three falcons. Curry Hammock State Park represents one of the best watchsites in the world to observe large numbers of Peregrine Falcons<sup>28</sup>. Several authors have reported ‘reverse’ migration moving north along both the west and east coasts of Florida as well as over the Florida Keys, presumably due to birds turning back north to avoid crossing the Straits of Florida<sup>11,20,28,34,46</sup>.

(1) Grassy Key (24°46'N 80°57'W), Florida, USA; migration count in 1995. Sixteen species have been observed in autumn. Raptors counted 11,400: Turkey Vulture (1,000; peak 186 on 20 October), Osprey (674; peak 41 on 20 October), Swallow-tailed Kite (54; peak 38 on 2 September), Mississippi Kite, Bald Eagle (15; peak late October), Northern Harrier (274; peak 23 on 9 October), Sharp-shinned Hawk (1,500; 166 on 17 October), Cooper's Hawk (185; peak 31 on October), Red-shouldered Hawk *B. lineatus* (86; peak 38 on 19 October), Broad-winged Hawk (2,780; peak 311 on 17 October), Short-tailed Hawk (79; peak late October), Swainson's Hawk (seven; peak late October), Red-tailed Hawk, American Kestrel (1,580; peak 627 on 9 October) Merlin (427; peak 43 on 9 October), Peregrine Falcon (882; peak 221 on 17 October)<sup>57</sup>.

(2) Curry Hammock State Park (24°44'N 80°59'W), Florida, USA; six years of migration counts in 1999–2004. Fifteen species have been observed between mid September and mid November. Mean number of raptors counted 11,746: Osprey (mean 1,070; single-day max. 340 on 1 October 2001), Swallow-tailed Kite (mean 11), Mississippi Kite (mean 21; single-day max. 23 on 16 September 2001), Bald Eagle (mean ten), Northern Harrier (mean 542; single-day max. 150 on 18 October 1999), Sharp-shinned Hawk (mean 2,819; single-day max. 873 on 18 October 1999), Cooper's Hawk (mean 466; single-day max. 127 on 4 October 2002), Red-shouldered Hawk (mean ten), Broad-winged Hawk (mean 1,703; single-day max. 883 on 16 October 2004), Short-tailed Hawk (mean 18; single-day max. 9 on 21 October 2004), Swainson's Hawk (mean 33; single-day max. 40 on 9 November 2001), Red-tailed Hawk (mean one), American Kestrel (mean 2,675; single-day max. 966 on 1 October 2001), Merlin (mean 475; single-day max. 91 on 30 September 2003), Peregrine Falcon (mean 1,790; single-day max. 521 on 1 October 2003) and unidentified raptors (mean 104)<sup>28</sup>.

*The Bahamas and Greater Antilles.*—No watchsites in the Bahamas. Standard migration data are available for two of the seven watchsites in the Greater Antilles. Fifteen species have been recorded at these seven watchsites including Turkey Vulture, Osprey, two kites, Northern Harrier, six hawks, Crested Caracara *Caracara cheriway* and three falcons. La Gran Piedra in eastern Cuba represents one of the best watchsites in the world to see large numbers of Ospreys<sup>42,43</sup>. Rodríguez<sup>40</sup> mentioned that a new watchsite had

been established in 2006 at Siboney (eastern Cuba) but no data have been published to date.

(3) Río Ariguanabo (23°00'N 82°30'W), La Habana province, Cuba; based on sporadic observations in 1983–92. Seven species have been observed between October and December. Osprey (two), Swallow-tailed Kite (one), Sharp-shinned Hawk (one), Broad-winged Hawk (four), American Kestrel (five), Merlin (two) and Peregrine Falcon (one)<sup>57</sup>.

(4) Carahatas (22°55'N 80°17'W), Matanzas province, Cuba; a migration count in 2001. Five species have been observed in mid September: Osprey (93), Sharp-shinned Hawk, Crested Caracara (three), American Kestrel and Merlin<sup>43</sup>.

(5) La Felicidad Dam (21°53'N 79°12'W), Sancti Spiritus province, Cuba; based on sporadic observations. One species has been observed: Osprey<sup>57</sup>.

(6) Cabo de San Antonio (21°52.0'N 84°57.07'W), Pinar del Río province, Cuba; a migration count in 2007. Twelve species were observed between mid July and early October. Raptors counted 4,186: Osprey (71), Swallow-tailed Kite (2,950), Mississippi Kite (272), Northern Harrier (three), Sharp-shinned Hawk (695), Cooper's Hawk (four), Broad-winged Hawk (27), Short-tailed Hawk (two), Swainson's Hawk (31), American Kestrel (24), Merlin (ten), Peregrine Falcon (76) and unidentified raptors (21)<sup>40</sup>.

(7) Vista Alegre (20°02'N 75°48'W), Santiago de Cuba, Cuba; based on sporadic observations in 1993–97. Seven species observed: Turkey Vulture, Osprey, Sharp-shinned Hawk, Broad-winged Hawk, Red-tailed Hawk, American Kestrel, Merlin and Peregrine Falcon<sup>57</sup>.

(8) La Gran Piedra (20°00'N 75°37'W), Santiago de Cuba province, Cuba; a migration count in 2001. Six species were observed on 18 days between late August and mid October: Osprey (1,223), Swallow-tailed Kite (67), Sharp-shinned Hawk, Broad-winged Hawk (13), Merlin and Peregrine Falcon<sup>5,42,43</sup>.

(9) Gonaïves Bay (19°27'N 72°41'W), Haiti, Hispaniola; casual observation on 28 August 1999. Two species were observed, namely Osprey (60) and Swallow-tailed Kite (two)<sup>10</sup>.

*Lesser Antilles and the islands off the north coast of South America.*—Standard migration data are unavailable from anywhere in these areas. Two watchsites are situated on the islands off northern South America. Six species have been recorded at

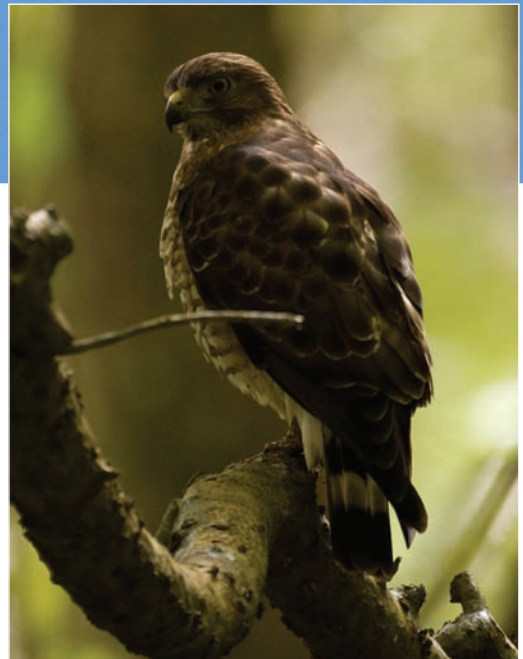




these two including Osprey, Swallow-tailed Kite, Yellow-headed Caracara *Milvago chimachima*, and three falcons. Flocks of migrating Broad-winged Hawks have been noted, primarily at the north-western and north-eastern ends of Trinidad (Chacachacare Island and Galera Point, respectively) and the south-western and north-eastern ends of Tobago (Crown Point and Little Tobago, respectively). Interestingly, Swainson's Hawk has been observed at all of these localities except Crown Point. The four points could be considered migration watchsites for raptors and other migrating birds.

(10) Bonaire (12°10'N 68°18'W), former Netherlands Antilles; based on sporadic observations year-round over several years. Six species: Osprey (38 autumn, 19 winter, 16 spring, 14 summer), Swallow-tailed Kite (one, spring), Yellow-headed Caracara (one, winter), American Kestrel (one autumn, two winter, two spring, two summer), Merlin (23 autumn, 19 winter, 13 spring, three summer), and Peregrine Falcon (21 autumn, 15 winter, 11 spring, one summer)<sup>35</sup>.

(11) Archipiélago de Los Roques (11°78'N 66°56'W), Venezuela; based on sporadic observations in 1992–93. Two species have been observed between August and January, namely Osprey and Peregrine Falcon<sup>57</sup>.



## Conservation implications

Europeans first arrived in the West Indies just over 500 years ago triggering extensive environmental changes that have adversely affected the region's avifauna through massive deforestation, the introduction of predators and competitors, and hunting<sup>53,54</sup>. Puerto Rico represents an extreme example of the effects of habitat destruction in the region because the entire island had been cutover by 1912, by which time less than 1% of virgin forest remained<sup>54</sup>. Three of the four raptors endemic to the West Indies are Critically Endangered because they have extremely small and fragmented populations that continue to decline. According to BirdLife International<sup>6</sup> the Cuban Kite's



Above: Ridgway's Hawks *Buteo ridgwayi*, adult (at left) bearing a lizard in its talons, Los Haitises National Park, Dominican Republic, May 2005 (Bill Clark), and juvenile (right) near Los Haitises, Dominican Republic, June 2011 (Thomas Hayes). Ridgway's Hawk is endemic to Hispaniola and is treated as Critically Endangered by BirdLife International due to habitat destruction and anthropomorphic pressures; it is now confined to a tiny area of the Dominican Republic. Ridgway's Hawk is a close relative of Red-shouldered *Buteo lineatus* and Broad-winged Hawks *B. platypterus*, both of which are migratory, forest-based raptors that breed principally in eastern North America. Red-shouldered Hawk has never occurred in the West Indies, but migrant Broad-winged Hawks use the West Indies both as a wintering ground and perhaps on migration to Middle and South America.

Facing page (top): Merlin *Falco columbarius* bearing a dragonfly in its talons, US Fish & Wildlife Refuge, Laguna Cartagena, Puerto Rico, February 2008 (Mike Morel / [www.mikemorelphotography.zenfolio.com](http://www.mikemorelphotography.zenfolio.com)). Merlins use the West Indies both as a wintering ground and perhaps on migration to and from Middle and South America.

Facing page (below): Broad-winged Hawk *Buteo platypterus brunnescens*, Río Abajo State Forest, March 2009 (Hadoram Shirihai / *Photographic handbook to birds of the world*). *B. p. brunnescens* is endemic to Puerto Rico, while four additional subspecies—*B. p. cubanensis*, *B. p. insulicola*, *B. p. rivierei* and *B. p. antillarum*—are found solely in the West Indies. A total of six subspecies, including North American migrant *B. p. platypterus*, occur in the Caribbean.

*Chondrohierax wilsonii* population (Critically Endangered) has been estimated at just 50–249 mature individuals (and there are very few recent observations), Ridgway's Hawk *Buteo ridgwayi* (Critically Endangered) at 160–240 mature individuals and Gundlach's Hawk *Accipiter gundlachi* (Endangered) at 300–400 mature individuals. (Not all authorities recognise the specific distinctness of Cuban Kite, and it might be argued that the species status of Gundlach's Hawk *vis-à-vis* Cooper's Hawk demands revisiting.) Habitat degradation is an important threat to both resident and migrant species. Good-quality habitat is important for species that overwinter in the West Indies and for those that stopover on islands before crossing the dangerous ecological barriers represented by the Gulf of Mexico and the Caribbean. Further field research is needed to clarify how habitat degradation affects migratory raptors in the Caribbean. The present paper, together with previous articles by Juhant<sup>22</sup> and Taylor<sup>51</sup> in *Neotropical Birding*, provides the most current update on where to watch raptor migration throughout Latin America and the Caribbean. Birdwatchers with the inspiration and desire to contribute to our understanding of raptor migration in the Neotropics now hold the key to accelerating the momentum. Raptor biologists will value any contribution, no matter how small, that you can make on this topic.

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REFERENCES

1. Andres, B. A. (1991) Migration of Sharp-shinned Hawk in the Dry Tortugas, Florida. *Wilson Bull.* 103: 491–493.
2. Andres, B., Haag, W. & Andres, S. (1991) Recent records of the Swainson’s Hawk in Trinidad and Tobago. *Living World, J. Trinidad & Tobago Field Natur. Club* 1991–1992: 45.
3. Baughman, J. L. (1947) A very early notice of hawk migration. *Auk* 64: 304.
4. Bildstein, K. L. & Zalles, J. I. (2005) Old World versus New World long-distance migration in Accipiters, Buteos, and falcons. In: Greenberg, R. & Marra, P. P. (eds.) *Birds of two worlds: the ecology and evolution of migration*. Baltimore: Johns Hopkins University Press.
5. Bildstein, K. L., Rodriguez Santana, F., Melian, L. O. & Martell, M. (2002) A new migration route for Swallow-tailed Kite *Elanoides forficatus* in east Cuba. *Cotinga* 18: 93–95.
6. BirdLife International (2012) IUCN Red List for birds. <http://www.birdlife.org> (accessed 19 March 2012).
7. Bradshaw, C. G., Kirwan, G. M. & Williams, R. S. R. (1997) First record of Swainson’s Hawk *Buteo swainsoni* for the West Indies. *Bull. Brit. Orn. Club* 117: 315–316.
8. Burke, P., Kirkconnell, A. & Whitehouse, S.M. (2000) Franklin’s Gull *Larus pipixcan* and Mississippi Kite *Ictinia mississippiensis* new to Cuba. *Cotinga* 14: 101–102.
9. Clark, W. S. (1985) Migration of the Merlin along the coast of New Jersey. *J. Raptor Res.* 19: 85–93.
10. Crouse, D. G. & Keith, A. R. (1999) A remarkable Osprey flight and first record of Swallow-tailed Kite for Hispaniola. *El Pitirre* 12: 91.

11. Darrow, H. N. (1983) Late fall movements of Turkey Vultures and hawks in the Florida Keys. *Florida Field Natur.* 11: 35–39.
12. Dinsmore, J. J. (1972) Avifauna of Little Tobago Island. *Quart. J. Florida Acad. Sci.* 35: 55–71.
13. Fairhurst, C. W. (1998) Sighting of Black Vulture (*Coragyps atratus*) in Cuba. *El Pitirre* 11: 46.
14. Ferguson-Lees, J. & Christie, D. A. (2001) *Raptors of the world*. Boston: Houghton Mifflin.
15. French, R. (2000) *A guide to the birds of Trinidad and Tobago*. Newtown Square, PA: Harrowood Books.
16. Fuller, M. R., Seegar, W. S. & Schueck, L. S. (1998) Routes and travel rates of migrating Peregrine Falcon *Falco peregrinus* and Swainson’s Hawk *Buteo swainsoni* in the Western Hemisphere. *J. Avian Biol.* 29: 433–440.
17. Gahbauer, M. A. (2008) Breeding, dispersal, and migration of urban Peregrine Falcons in eastern North America. Ph.D. thesis. Montreal: McGill University.
18. Hayes, F. E. (2001) First sight records of Swainson’s Hawk (*Buteo swainsoni*) for Trinidad and Chacachare Island, with comments on its status and trans-Caribbean migration. *El Pitirre* 14: 63–65.
19. Hayes, F. E. & Samad, I. (2002) Avifauna of the ‘Dragon’s’: the Boscas Islands, northern Gulf of Paria, between Venezuela and Trinidad. *Stud. Trinidad & Tobago Orn. Honouring Richard French* 11: 62–85.
20. Hoffman, W. & Darrow, H. (1992) Migration of diurnal raptors from the Florida Keys into the West Indies. *Hawk Migr. Stud.* 17: 7–14.
21. Holroyd, G. & Duxbury, J. (1999) Travels of Peregrine Falcon #5735. *Blue Jay* 57: 146–149.
22. Juhant, M. A. (2011) Where to watch raptor migration in South America. *Neotrop. Birding* 9: 8–16.
23. Keith, A. R., Wiley, J. W., Latta, S. C. & Ottenwalder, J. A. (2003) *The birds of Hispaniola: Haiti and the Dominican Republic*. BOU Checklist No. 21. Tring: British Ornithologists’ Union.
24. Kenefick, M. & Hayes, F. E. (2006) Trans-Atlantic vagrancy of Palearctic birds in Trinidad and Tobago. *J. Carib. Orn.* 19: 61–72.
25. Kirwan, G. M., Calder3n, D., Minns, J. & Roesler, I. (2009) Neotropical notebook. *Cotinga* 31: 158–174.
26. Levesque, A. & Malglaive, L. (2003) First documented record of Marsh Harrier for the West Indies and the New World. *N. Amer. Birds* 57: 564–565.
27. Lodge, T. E. (2010) *The Everglades handbook: understanding the ecosystem*. Third edn. Boca Raton: CRC Press, Taylor & Francis Group.
28. Lott, C. A. (2006) A new raptor migration monitoring site in the Florida Keys: counts from 1999–2004. *J. Raptor Res.* 40: 200–209.
29. Martell, M. S., Henny, C. J., Nye, P. E. & Solensky, M. J. (2001) Fall migration routes, timing, and wintering

- sites of North American Ospreys as determined by satellite telemetry. *Condor* 103: 715–724.
30. Martell, M. S., McMillian, M. A., Solensky, M. J. & Mealey, B. K. (2004) Partial migration and wintering use of Florida by Ospreys. *J. Raptor Res.* 38: 55–61.
  31. Mazar Barnett, J., Kirwan, G. M. & Minns, J. (2005) Neotropical notebook. *Cotinga* 23: 78–91.
  32. McGrady, M. J., Young, G. S. & Seegar, W. S. (2006) Migration of a Peregrine Falcon *Falco peregrinus* over water in the vicinity of a hurricane. *Ring. & Migr.* 23: 80–84.
  33. Merkord, C. L., Rodriguez, R. & Faaborg, J. (2006) Second and third records of Western Marsh Harrier (*Circus aeruginosus*) for the Western Hemisphere in Puerto Rico. *J. Carib. Orn.* 19: 42–44.
  34. Moore, R. (2000) A fallout of Turkey Vultures over Florida Bay with notes on water-crossing behavior. *Florida Field Natur.* 28: 118–121.
  35. Nijman, V., Prins, T. G. & Reuter, J. H. (2005) Timing and abundance of migrant raptors on Bonaire, Netherlands Antilles. *J. Raptor Res.* 39: 94–97.
  36. Norton, R. L., White, A. & Dobson, A. (2003) West Indies & Bermuda. *N. Amer. Birds* 57: 131–133.
  37. Ogden, J. C. (1974) The Short-tailed Hawk in Florida I. Migration, habitat, hunting techniques, and food habits. *Auk* 91: 95–110.
  38. Pinchon, P. R. & Vaurie, C. (1961) The Kestrel (*Falco tinnunculus*) in the New World. *Auk* 78: 92–93.
  39. Raffaele, H., Wiley, J., Garrido, O., Keith, A. & Raffaele, J. (1998) *A guide to the birds of the West Indies*. Princeton, NJ: Princeton University Press.
  40. Rodríguez-Santana, F. (2010) Reports of Cooper's Hawk (*Accipiter cooperii*), Swainson's Hawk (*Buteo swainsoni*), and Short-tailed Hawk (*Buteo brachyurus*) in Cuba. *J. Raptor Res.* 44: 146–150.
  41. Rodriguez, F., Martell, M., Nye, P. & Bildstein, K. L. (2001) Osprey migration through Cuba. In: Bildstein, K. L. & Klem, D. (eds.) *Hawkwatching in the Americas*. North Wales, PA: Hawk Migration Association of North America.
  42. Rodríguez-Santana, F., Martell, M. & Bildstein, K. L. (2002) Highest single-day count of migrating Ospreys (*Pandion haliaetus*) for Cuba and the insular Caribbean. *El Pitirre* 15: 127–128.
  43. Rodríguez-Santana, F., Hernandez, L. M., Martell, M. & Bildstein, K. L. (2003) Cuban raptor-migration counts in 2001. *J. Raptor Res.* 37: 330–333.
  44. Rowlett, R. A. (1980) Migrant Broad-winged Hawks in Tobago. *J. Hawk Migr. Assoc. N. Amer.* 2: 54.
  45. Santana, E. C. & Temple, S. A. (1987) Recoveries of banded Ospreys in the West Indies. *J. Field Orn.* 58: 26–30.
  46. Simons, M. M. (1977) Reverse migration of Sharp-shinned Hawk on the west coast of Florida. *Florida Field Natur.* 5: 43–44.
  47. Smith, N. G. (1980) Hawk and vulture migrations in the Neotropics. In: Keast, A. & Morton, E. S. (eds.) *Migrant birds in the Neotropics: ecology, behavior, distribution and conservation*. Washington DC: Smithsonian Institution Press.
  48. Smith, J. P., Farmer, C. J., Hoffman, S. W., Lott, C. A., Goodrich, L. J., Simon, J., Riley, C. & Ruelas, I. E. (2008) Trends in autumn counts of migratory raptors around the Gulf of Mexico, 1995–2005. In: Bildstein, K. L., Smith, J. P., Ruelas, I. E. & Veit, R. R. (eds.) *State of North America's birds of prey*. Ser. Orn. No. 3. Cambridge, MA: Nuttall Ornithological Club & Washington DC: American Ornithologists' Union.
  49. Soy, J. P. & Hartley, J. R. M. (1998) The Black Vulture (*Coragyps atratus*) continues wandering Cuba. *El Pitirre* 11: 45.
  50. Stout, W. E., Greene, V. L. & Postupalsky, S. (2009) Migration routes, reproduction, and lifespan of a translocated Osprey. *Wilson J. Orn.* 121: 203–206.
  51. Taylor, J. (2011) In search of *los azacuanes*: where to watch raptor migration in Middle America. *Neotrop. Birding* 8: 12–21.
  52. Wauer, R. H. & Wunderle, J. M. (1992) The effect of Hurricane Hugo on bird populations on St. Croix, U.S. Virgin Islands. *Wilson Bull.* 104: 656–673.
  53. Wiley, J. W. (1985) Status and conservation of forest raptors in the West Indies. In: Newton, I. & Chancellor, R. C. (eds.) *Conservation studies on raptors*. Tech. Publ. 5. Cambridge, UK: International Council for Preservation of Birds.
  54. Wiley, J. W. (1986) Habitat change and its effects on Puerto Rican raptors. *Birds of Prey Bull.* 3: 51–56.
  55. Wingate, D. B. (2002) Mississippi Kite, new record for Bermuda. *Bermuda Audubon Soc. Newsletter* 13: 2–3.
  56. Wotzkow, C. & Wiley, J. W. (1988) Turkey Vulture surveys in Cuba. *J. Raptor Res.* 22: 3–7.
  57. Zalles, J. I. & Bildstein, K. L. (2000) *Raptor watch: a global directory of raptor migration sites*. Cambridge, UK: BirdLife International (Conservation Series 9) & Kempton, PA: Hawk Mountain Sanctuary.
  58. Zimmerman, G. M. (2004) Studies of the annual cycle of the Swallow-tailed Kite (*Elanoides forficatus*): migration, habitat use, and parasites. M.Sc. thesis. Atlanta: Georgia Southern University.

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