

MOVING TARGETS: THE SCIENCE AND CONSERVATION OF MIGRATING RAPTORS IN THE WESTERN HEMISPHERE

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ABSTRACT

At least 57 of 99 species of New World raptors migrate. Of these, 5 (9%) are complete migrants, 33 (58%) are partial migrants, and 19 (33%) are local, irruptive, or altitudinal migrants. All 34 species of Nearctic breeders migrate; 25 of 86 Neotropical breeders migrate within the tropics; and 21 of 62 Austral breeders migrate. Principal threats to New World raptors include habitat loss (29 species), environmental contaminants (7 species), and direct persecution (8 species). Published observations of long-distance raptor migration in the New World date from the 16th Century. Scientific studies of the phenomenon were initiated in the later part of the 19th Century. Serious conservation efforts date back to the 1930s, when Hawk Mountain Sanctuary, the world's first refuge for migratory birds of prey, was founded to reduce the direct persecution of birds of prey at the site. *Hawks Aloft Worldwide (HAWW)*, the Sanctuary's global conservation initiative, uses the spectacle of raptor migration to capture support for local conservation action along international migration corridors. *HAWW* has identified cooperators in more than 100 countries on six continents, and is currently drafting site descriptions for over 300 raptor migration watchsites worldwide. At least 81 of these watchsites are or could be counting 10,000 or more migrating raptors annually. *HAWW* is focusing its initial training efforts in the Neotropics, where it has identified 60 cooperators and 34 watchsites. In 1995, the Sanctuary hosted a workshop for Latin American hawkwatchers in Veracruz, Mexico, where individuals from Hawk Mountain and the Veracruz Bird Observatory discussed aspects of watchsite operations with 15 conservationists from 7 Latin American countries. *HAWW* published a 200-page, bilingual (Spanish-English) training manual in 1995. Data from *HAWW* watchsites, together with previously published information and recently available satellite-telemetry data are helping researchers determine where and when raptors migrate, and are uniting local conservationists globally in practical and effective raptor protection.

INTRODUCTION

RAPTOR MIGRATION IN THE NEW WORLD

Raptor migration in the New World is complex and confusing. Populations of at least 57 of 99 species of New World raptors migrate in the region. Five species (9%) are complete migrants, 33 (58%) are partial migrants, and 19 (33%) are local, irruptive, or altitudinal migrants. All 34 species of Nearctic breeders migrate; 25 of 86 Neotropical breeders migrate within the tropics; and 21 of 62 Austral breeders migrate (Table 1).

Table 1
Migrating populations of Western Hemisphere raptors

| Type migrant | Breeding Area | | |
|--|----------------|----------|---------|
| | Neartic | Tropical | Austral |
| Complete migrants | | | |
| Osprey <i>Pandion haliaetus</i> * ² | X ^b | | |
| Mississippi Kite <i>Ictinia mississippiensis</i> * | X | | |
| Broad-winged Hawk <i>Buteo platypterus</i> * | X | | |
| Swainson's Hawk <i>B. swainsoni</i> * | X | | |
| Rough-legged Hawk <i>B. lagopus</i> | X | | |
| Partial migrants | | | |
| Black Vulture <i>Coragyps auratus</i> * | X | X | |
| Vulture <i>Cathartes aura</i> * | X | X | X |
| Swallow-tailed Kite <i>Elanoides forficatus</i> * | X | X | X |
| White-tailed Kite <i>Elanus leucurus</i> * | X ^b | ? | X |
| Snail Kite <i>Rostrhamus sociabilis</i> * | X | X | X |
| Plumbeous Kite <i>Ictinia plumbea</i> * | X | X | X |
| Bald Eagle <i>Haliaeetus leucocephalus</i> | X | | |
| Northern Harrier <i>Circus cyaneus</i> * | X | | |
| Cinereous Harrier <i>C. cinereus</i> | | | X |
| Long-winged Harrier <i>C. buffoni</i> | | | X |
| Gray-bellied Hawk <i>Accipiter poliogaster</i> | | X | X |
| Sharp-shinned Hawk <i>A. striatus</i> * | | | X |
| Cooper's Hawk <i>A. cooperii</i> | X | | |
| Bicolored Hawk <i>A. bicolor</i> | | | X |
| Northern Goshawk <i>A. gentilis</i> | X | | |
| Gray Hawk <i>Asturina nitida</i> * | X | ? | |
| Common Black Hawk <i>Buteogallus anthracinus</i> * | X | ? | |
| Savanna Hawk <i>B. meridionalis</i> | | X | X |
| Harris' Hawk <i>Parabuteo unicinctus</i> * | X | | |
| Red-shouldered Hawk <i>Buteo lineatus</i> | X | | |
| White-tailed Hawk <i>B. albicaudatus</i> * | ? | | X |
| Red-backed Hawk <i>B. polyosoma</i> | | | X |
| Zone-tailed Hawk <i>B. albonotatus</i> * | X | ? | |
| Red-tailed Hawk <i>B. jamaicensis</i> | X | | |
| Ferruginous Hawk <i>Buteo regalis</i> | X | | |
| Golden Eagle <i>Aquila chrysaetos</i> | X | | |
| Chimango Caracara <i>Milvago chimango</i> | | | X |
| American Kestrel <i>Falco sparverius</i> * | X | | X |
| Plomado Falcon <i>F. femoralis</i> * | X | X | X |
| Merlin <i>F. columbarius</i> * | X | | |
| Prairie Falcon <i>F. mexicanus</i> | X | | |
| Gyr Falcon <i>F. rusticolus</i> | X | | |
| Peregrine Falcon <i>F. peregrinus</i> * | X | | X |

| Type migrant | Breeding Area | | |
|---|---------------|-----------|-----------|
| | Nearctic | Tropical | Austral |
| Local and irruptive migrants | | | |
| Savanna Vulture <i>Cathartes burrovianus</i> | | X | |
| Yellow-headed Vulture <i>C. melambrotus</i> | | ? | |
| California Condor <i>Gymnogyps californianus</i> | X | | |
| Andean Condor <i>Vultur gryphus</i> | | X | X |
| King Vulture <i>Sarcoramphus papa</i> | | ? | |
| Hook-billed Kite <i>Chondrohierax uncinatus</i> * | X | | |
| Rufous-thighed Kite <i>Harpagus diodon</i> | | ? | |
| Great Black Hawk <i>Buteogallus urubitinga</i> | | ? | |
| Black-collared Hawk <i>Buteo lineatus</i> | | ? | |
| Black-chested Eagle <i>Geranoaetus melanoleucus</i> | | | ? |
| White-rumped Hawk <i>Buteo leucorhynchus</i> | | ? | |
| Short-tailed Hawk <i>B. brevichrysus</i> * | X | | |
| Puna Hawk <i>B. poecilochroa</i> | | ? | |
| Rufous-tailed <i>B. ventralis</i> | | | ? |
| Harpy Eagle <i>Harpia harpyja</i> | | ? | |
| Striated Caracara <i>Phalacrocorax australis</i> | | | ? |
| Crested Caracara <i>Polyborus plancus</i> * | | X | |
| Bat Falcon <i>Falco rufigularis</i> | | ? | |
| Orange-breasted Falcon <i>F. deatoleucus</i> | | ? | |
| Total number | 34 | 25 | 21 |

*Birds with asterisks occur in North, Central, and South America.

^bXs indicate known migrants; ?s indicate suspected migrants.

Raptor migration is better understood in Canada and the United States, than elsewhere in the Western Hemisphere. Major migratory corridors in North America include the Atlantic Coast, the Gulf of Mexico coast, and the Appalachian and Rocky Mountains. In North America, principal barriers to migrating raptors include the Great Lakes and the Caribbean Sea. South of the United States, the mountains and coasts of Mexico and Central America funnel large numbers of Nearctic migrants through the region to and from South America. Raptor migration in South America is yet to be studied in detail (but see Davis, 1989; Zuquim Antas, 1994; Woodbridge et al., 1995). For the most part, coastal migration in South America is limited to small numbers of a few species (e.g., Osprey [*Pandion haliaetus*] and Peregrine Falcon [*Falco peregrinus*]). Intratropical raptor migration occurs mainly among species that inhabit seasonal wetlands (e.g., Snail Kite [*Rostrehamus sociabilis*], or that feed on swarming insects (Plumbeous Kite [*Ictinia plumbea*], Swallow-tailed Kite [*Elanoides forficatus*]; Bildstein and Zalles, unpubl. data). Austral migration is poorly understood (Chesser, 1994).

Principal threats to New World raptors include habitat loss (29 species), environmental contaminants (7 species), and direct persecution (8 species)(Bildstein et al. 1998, unpubl. data).

THE STUDY OF RAPTOR MIGRATION IN THE NEW WORLD

Early efforts – New World accounts of migrating raptors date from 1555, when Gonzalo Fernández de Oviedo y Valdés, an official chronicler of Spanish colonial exploration and conquest, described the seasonal movements of large flocks of raptors over western Cuba and the Darien of eastern Panama (Baughman, 1947). Although fleeting references to similar events can be gleaned from writings of America's 18th and 19th Century natural historians and ornithologists, most of these accounts consist of cursory reports of what often were viewed as irregular and exceptional events (cf. Goldman, 1970). For the most part, natural historians of the era (e.g., Catesby, 1731-43, Audubon 1840-1844, Wilson 1840), appear to have been largely unaware of the large-scale movements of these birds. Indeed, as recently as the early part of the 20th Century, most of what was known regarding the migratory habits of North American raptors was due to extensive turn-of-the-century collecting efforts targeting the food habits of the various species, many of which were considered vermin at the time (cf. Fisher, 1893; May, 1935).

In hindsight, the delayed discovery of the spectacle of New World raptor migration is understandable. Part of the delay lay in the birds' inconspicuous nature and secretive behavior during the breeding season. Part lay in the brief, episodic, and inland nature of much of the flight. Part lay in the fact that, without binoculars or field glasses, much of the flight was too high to be seen, and that without modern field guides, many of the birds could not be identified even when seen. A case in point is the now widely recognized migration of eastern North America's smallest Buteo, the Broad-winged Hawk (*Buteo platypterus*).

There is now a voluminous (cf. Olendorff and Olendorff, 1969) and accumulating (Goodrich et al., 1996) literature regarding the migratory movements of this gregarious long-distance migrant. However, as recently as one hundred years ago, many respected ornithologists considered the Broad-winged Hawk to be a year-round resident throughout much of its range in North America (cf. Stone, 1894; Warren, 1890). The earliest account of Broad-winged Hawk migration we have found is one published in 1878 by amateur ornithologist G. B. Sennett, who described a northbound, spring flight of at least 50 broadwings in south Texas in 1877 (Sennett, 1878). Several years later other, "field-glass" assisted observers were reporting "immense clusters" of Broad-winged Hawks on autumn migration in northeastern North America (cf. Trowbridge, 1895). But it was not until the early 1930s, that raptor migration science really entered the modern age.

By then, growing numbers of birders were using prismatic binoculars (Kastner, 1986). Far more powerful and accurate than 2 and 4x field glasses, 6 and 7x binoculars enabled their users to see the migrating raptors "closer" and more clearly than ever before. The advent of the binocular age set the stage for the next great development in raptor migration science: the modern field guide. Roger Tory Peterson's "A field guide to the birds" was published in the spring of 1934 (Peterson, 1934). The guide provided raptor-migration enthusiasts with the perfect accompaniment to binoculars: a series of simple, schematic, perched and in-flight portraits of the raptors of eastern North America, together with lines indicating where to look for essential field marks on each species. This remarkably effective system, which Peterson himself invented, at once reduced confusion and increased the certainty of field identification, ensuring the rapid growth of birdwatching in general and hawkwatching in particular.

The modern era – The establishment of Hawk Mountain Sanctuary in 1934 as world's first refuge for migrating birds of prey provided the first venue for the new sport of hawkwatching. New York conservationist Rosalie Edge had established Hawk Mountain Sanctuary in the central Appalachian Mountains of eastern Pennsylvania to halt the slaughter of hawks and eagles migrating along the site's rocky ridges, as well as to foster an understanding of Appalachian Mountain environments (Broun, 1949). The region's prevailing northwesterly winds and mountain topography place Hawk Mountain along a major migration corridor for Western Hemisphere raptors. Each autumn, tens of thousands of raptors (hawks, eagles, falcons, and ospreys) and New World vultures from northeastern North America migrate over Hawk Mountain (Bednarz et al., 1990; Allen et al., 1995). Occasionally, spectacular migrations of thousands of birds are recorded on single days (Broun, 1949). Between 1934 and 1995, an annual average of more than 17,000 diurnal raptors and vultures representing 16 of North America's 34 species of raptors and vultures have been counted at the Sanctuary (Allen et al., 1995).

Prior to the Sanctuary's founding, hunters traditionally gathered at Hawk Mountain each autumn to shoot migrating hawks and eagles that were traveling south. Raptors were considered vermin at the time, and state authorities were paying bounties on several species. Over the years, thousands of migrating raptors were killed along the Appalachian Mountains in eastern North America. Because of easy access, Hawk Mountain, especially, became a favored shooting locale. By the early 1930s, gunning at the site was so intense that individuals collected brass from discharged cartridges and sold it for scrap metal (Broun, 1949).

The scene changed dramatically in August of 1934, when Rosalie Edge hired Maurice Broun as head ornithologist and warden of the recently acquired mountaintop refuge. Broun spent his first year posting the property and confronting local shooters. Publicity surrounding the Sanctuary's formation was considerable, and the following fall, birdwatchers and naturalists began to flock to the "newly discovered" wildlife refuge in large numbers. As they did, the mountain's use as a shooting gallery faded into history. By the late 1940s, Hawk Mountain Sanctuary was fast becoming a model program in grass-roots conservation science, ecological monitoring, and environmental education. In the 1950s and 1960s, Maurice Broun and his assistant, Alex Nagy, served as informal mentors to numerous raptor conservationists throughout eastern North America, who went on to establish their own raptor migration watchsites. Nagy and Broun, together with Sanctuary Association President Joe Taylor, and board member Michael Harwood, helped establish the Hawk Migration Association of North America in 1974. Today that organization has grown into an active and effective group of more than 800 individuals devoted entirely to the study and conservation of migrating raptors. In the 1970s and 1980s, Nagy's successor, Jim Brett, expanded the Sanctuary's mentoring role by creating Hawk Mountain's international internship program, which, as of early 1997, had trained more than 160 young scientists and conservationists from 26 countries on 6 continents.

At the same time that monitoring visible hawk migration at important migration watchsites was becoming popular, conservationists started to trap and band migrants in order to learn more about the geographical origins and destinations of the birds. Beginning mainly in the 1930s, large numbers of raptors have been banded in the Western Hemisphere (Robbins, 1986). Although many raptors have been banded at

nest sites as nestlings, many more have been banded at trapping stations along important migratory corridors (i.e., Hawk Ridge, Minnesota [Evans and Rosenfield, 1985]; Cedar Grove, Wisconsin [Mueller and Berger, 1970]; Hawk Cliff, Ontario [Duncan, 1981]; Raccoon Ridge [Soucy, 1976], and Cape May Point [Clark, 1985], New Jersey; and the Kittatinny Ridge, Pennsylvania [Holt and Frock, 1980]). As the number of birds banded and subsequent encounters increased, banding efforts began to yield considerable insights into raptor migration ecology. Examples include (1) an analysis of 1378 recoveries of 18,620 banded Osprey (*Pandion haliaetus*), indicating that substantial portions of both eastern and midwestern U.S. populations of Ospreys are overwintering in South America, north and south of the Equator (36% and 24% of all recoveries, respectively), as well as in the Caribbean Basin, Central America, and the southern U. S. (40% of all recoveries) (Poole and Agler, 1987); (2) an analysis of 337 recoveries of 27,399 Sharp-shinned Hawks (*Accipiter striatus*) banded at Cape May Point, New Jersey, indicating age-specific differences in the use of migration corridors (adults migrate farther inland than do juveniles) (Clark, 1985); and, (3) an analysis of 1256 Northern Harriers banded at four trapping stations between 1971 and 1980 indicating age and sex-specific differences in timing of migration (juveniles migrate earlier than adults and males migrate earlier than females) (Bildstein et al., 1984).

Similarly, banding efforts have yielded important information regarding raptor conservation. An examination of subsequent encounters of the 422,000 raptors banded in North America between 1931 and 1980, for example, indicates substantial declines in the numbers of individuals recovered "shot" over this period (55-85% in the 1930s to 3-16% in the 1970s), north, but not south of Mexico (Robbins, 1986). An analysis of banded Ospreys recovered between 1930 and 1980 also revealed declines in birds shot over the period, but again only north, and not south the U.S.-Mexican border (Poole and Agler, 1987).

Hawk-watching has been an avocational pastime in North America since the middle 1930s (Broun, 1949). During the past 60 years, more than 1.7 million visitors have traveled to Hawk Mountain Sanctuary to witness the fall spectacle of broadwing and raptor migration (Hawk Mountain Sanctuary, unpubl. data). Today, the sport is practiced throughout the continent (Brett 1991, Heintzelman, 1975, 1988). More than 800 Hawk Migration Association of North America members, monitor raptor migration at hundreds of sites throughout North America (Bildstein, 1997). These and other avid hawkwatchers continue to expand our knowledge regarding the geography of raptor migration in little-known areas of the continent, including the western U.S. (Hoffman, 1985).

HAWKS ALOFT WORLDWIDE

Unlike global climate change and many other international environmental concerns, much of the information needed to protect migratory raptors lies in the hands of local conservationists (cf., Mittermeier and Bowles, 1994). Unfortunately, much of this "expertise" remains largely unorganized and inaccessible to other conservationists and scientists. *Hawks Aloft Worldwide* is Hawk Mountain Sanctuary's response to this situation. The initiative offers a cooperative network strategy for strengthening local community-based conservation action. The project uses the spectacle of long-distance raptor migration together with small-scale, community-based conservation, to capture the attention of local populations, and to

increase their environmental awareness, both for the birds and the sensitive habitats upon which they depend (Soule and Kohm, 1989). *Hawks Aloft Worldwide* also promotes the use of raptors as bioindicators for the ecosystems they inhabit, the need for greater international cooperation in conservation efforts, and, when appropriate, the use of ecotourism to support indigenous populations and to protect natural habitats. (Senner and Brett, 1989; Bildstein et al., 1993; Brett and Bildstein, 1993).

Specifically, *Hawks Aloft Worldwide* is (1) identifying raptor migration watchsites that can function as local conservation foci, (2) publishing the first "World Atlas" of such sites for use by the conservation community, (3) training local conservationists at newly identified raptor migration watchsites in ecological research, environmental monitoring and education, focused advocacy, and reform, and (4) forming a sustainable global conservation network. The initiative is organized in two phases. Phase I involves using existing literature and Hawk Mountain's extensive personal contacts to identify and describe sites of ecological significance to raptor populations. Phase II focuses on developing training materials, and offering internships and workshops for local conservationists overseeing these sites.

Before we can protect migrating hawks, eagles, and falcons, we need to know where, when, and how they migrate (cf., Lubchenco et al., 1991). The initiative's forthcoming "World atlas of hawk and eagle migration watchsites" is modeled after the International Council for Bird Preservation and the International Waterfowl and Wetlands Research Bureau's "Important Bird Areas in Europe" (Grimmett and Jones, 1989), and the International Union for Conservation of Nature and Natural Resources' "Directory of Neotropical Wetlands" (Scott and Carbonell, 1986).

The Atlas consists of a series of country descriptions grouped by continent. Each description begins with an overview of the country and its migratory raptors, and includes a description of raptor migration in the country and the conservation status of migratory raptors. Country descriptions are followed by an inventory of all known migration watchsites, together with maps depicting their locations. Watchsite descriptions include directions to the site, information on habitat associations, and tenure and use, degree of protection, threats to hawks and eagles, ongoing research and conservation efforts, relevant literature, and the name and address of the local contact organization or individual, along with a summary account of raptor migration at the site. The Atlas includes chapters on the biology and geography of raptor migration, an overview of the initiative's network, conservation strategies for migrating raptors, and an extensive bibliography of the English language raptor-migration literature. Copies of the Atlas will be distributed to participating participants, as well as to appropriate government agencies and non-governmental organizations.

Once we know where and when the birds migrate, we need to train and assist local conservationists in their efforts to protect them (cf., Soule and Kohm, 1989). To accomplish this goal, *Hawks Aloft Worldwide* is training conservationists and community activists to affect action at critical migration sites through environmental education and focused advocacy, as well as to strengthen their influence, both locally and regionally. A 200-page watchsite manual published in 1995 is a major aspect of this effort (Bildstein and Zalles, 1995).

Whenever possible, *Hawks Aloft Worldwide* is working with existing organizations, and attempting to unify local and regional groups. As participation in the network increases, and as new sites are found, the Sanctuary's international

internship program is being used to train individuals from these locations on an ongoing basis.

Young conservationists trained as part of Hawk Mountain's International Internship Program are returning to their home countries, where they will serve as regional sources of information for network participants, as well as offer feedback to Sanctuary staff. Although the Sanctuary serves as an initial focal point for training efforts, eventually, most network training will occur off-site as a result of our efforts to train the trainers.

In sum, *Hawks Aloft Worldwide* is a multi-directional information and expertise network designed to encourage and facilitate community-based conservation by providing information resources that, otherwise, would be unavailable to most local efforts. The initiative offers the advantages of international cooperation without impinging on the rights and responsibilities of local organizations to participate fully in decisions regarding the protection of their natural resources. By operating at this level, and by using the birds, themselves, to capture the attention of local peoples, *Hawks Aloft Worldwide* offers the promise of truly practical and effective conservation, both for migrating raptors, and for the sensitive stop-over habitats upon which they depend.



Fig. 1. Locations of 31 Neotropical raptor migration watchsites. (Three additional Neotropical sites in Cuba are not depicted.) *Hawks Aloft Worldwide* has cooperators in every Neotropical country except Belize, Guyana, Suriname, and Uruguay.

Because we share a common biological resource, and because two languages (Spanish and English) allow us to reach conservationists throughout most of the Western Hemisphere, *Hawks Aloft Worldwide* is focusing its initial training efforts in the Neotropics (Fig. 1), where large numbers of Neartic migratory raptors overwinter, and where conservation opportunities abound.

Mexico and Central America are major migratory corridors for continental, and in a few instances, world populations of many North American raptors. One example of this phenomenon is a *Hawks Aloft Worldwide* watchsite in coastal Veracruz, Mexico. The site was established in 1991 by former Sanctuary interns, Ernesto Ruelas and Evodia Silva, together with other Mexican conservationists. Coastal lowlands near the small town of Cardel were chosen as the primary watchsite because earlier reports suggested a massive migration in the region.

Spring migration at Veracruz is phenomenal. In its first season of operation, the watch-site tallied over 400,000 birds, representing 17 species, in just 45 days of springtime operation. Southbound migration is even more astounding. Autumn counts between 1992 and 1996 have yielded between 2.5 and 4.5 million birds annually. To put these numbers into perspective, it took Hawk Mountain Sanctuary 57 years to count its millionth raptor – Veracruz managed to pass that milestone in less than one season of operation.

The Veracruz watchsite appears to be monitoring the migratory movements of over 90% of the world's Broad-winged Hawks, and, perhaps as many as 80% of the world's Swainson's Hawks (*Buteo swainsoni*). The value of the site for assessing populations of these two species is considerable. Successive counts of over one million broadwings each autumn have doubled our previous estimates of the world population of this forest-dwelling buteo. On a more ominous note, annual counts at Veracruz are helping to track the overall impact on Swainson's Hawks of recently discovered massive kills of this species resulting from pesticide contamination in the Pampas of Argentina.

Perhaps even more importantly, the site also has developed a series of educational brochures, posters, and workshop guides, and is offering programs in environmental education for students in primary schools, along with workshops for their teachers.

Local enthusiasm for the project is growing, both among conservationists and within the local community at large. Pronatura-Veracruz recently established offices in Xalapa, near Cardel, to be closer to the project, and local community leaders have offered to help. Plans are underway to erect a sign at the entrance to the city heralding Cardel as one of the world's greatest raptor migration concentration points and at least one city restaurant now mentions the migration on its menu.

Hawks Aloft Worldwide and Pronatura-Veracruz, co-organized a regional training workshop for Latin American watchsite workers in Xalapa, Mexico, in April 1995. The 6-day workshop attracted 15 conservationists from 8 Latin American and Caribbean countries. Participants visited the Veracruz watchsite, discussed their common problems and concerns, and received instruction on a range of subjects regarding migration watchsites and raptor conservation. As a result of the meeting, six new raptor migration watch sites were added to the Atlas, and a bilingual (Spanish-English) article mapping raptor migration in Costa Rica, was discussed and planned. (The resulting article, the first to formally describe raptor migration in Costa Rica, was published in the *Journal of Hawk Migration Studies* in the autumn of 1995 [Hildago et al., 1995].) The Veracruz workshop also served as a testing ground for the

Spanish language version of *Hawks Aloft Worldwide's* watchsite manual.

The Veracruz workshop spawned a second watchsite workshop in Guatemala. The Guatemalan workshop, which was held April of 1996 at the invitation of *Hawks Aloft Worldwide* participant FUNDAECO, a community based conservation organization, as well as other *HAWW* cooperators, was led by several participants from the Veracruz workshop. The workshop was designed to help FUNDAECO design a raptor migration monitoring program for Guatemala (Montejo-Diaz and Ruelas-Inzunza, 1997). The Guatemalan experience suggests that *Hawks Aloft Worldwide's* training activities are reaching the appropriate audience, individuals who are willing to pass their knowledge along to others.

Elsewhere in Latin America, network participants in Colombia are using Hawk Mountain Sanctuary brochures and posters as models in a education campaign to halt the slaughter of Swainson's and Broad-winged hawks that roost in the Combeima Canyon each spring while en route to their breeding grounds in North America. The hawks are being shot by lantern light while they sleep because local legends suggest that killing them hastens the passage of Lent, and that fat rendered from their carcasses cures everything from arthritis to cataracts (Bildstein et al., 1993). Given similarities between the current plight of raptors in Combeima and those at Hawk Mountain in the 1930s, Combeima Canyon appears to be an especially appropriate participant in *Hawks Aloft Worldwide*.

Satellite telemetry promises to enhance *HAWW's* efforts to conserve migrating raptors in the Western Hemisphere. In central South America, for example, watchsite counts and behavioral observations, combined with data from satellite telemetry, already are helping to establish the lowlands of eastern Bolivia as a major continental corridor for several species of kites, as well as Swainson's Hawks (*HAWW* unpubl. data; S. Davis, pers. comm.; B. Woodbridge, C. Marquez, and M. Bechard, pers. comm.; K. Myers, pers. comm.).

The project's early successes indicate that Hawk Mountain Sanctuary is no longer alone in its efforts. Throughout the Western Hemisphere, raptor conservationists are working together at important migration watchsites, monitoring raptor populations, studying raptor biology, and helping to protect the birds. Such efforts, coupled with those involving the recently emerging field of satellite telemetry, offer considerable promise for linking local peoples across political borders in their attempts to protect and preserve their natural and human resources.

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