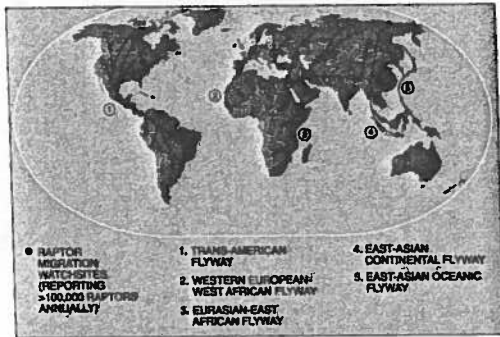


RAPTORS



Diurnal raptors (Falconiformes), represent a diverse group of 300 species of highly mobile, land-based predators that occur across a range of habitats on six continents and numerous islands. Most exist at the tops of food chains, and their populations are particularly sensitive to changes in ecosystem function, quality, and energy flow. Wide-ranging and secretive, raptors are difficult to survey and monitor. Each year millions of raptors embark upon long-distance, sometimes intercontinental migrations. They do so—as do most birds—to avoid periods of food scarcity and severe weather. Although many travel across broad fronts, others aggregate along established flyways where geography and weather create conditions along so-called “leading lines” that provide updrafts or thermals upon which raptors can soar at low energetic cost. Flocking helps individuals find energy-saving thermals and updrafts more quickly, and enormous aggregations of as many as hundreds of thousands of raptors predictably appear along mountain ridges, coastal plains, isthmuses, and peninsulas. These huge assemblages present conservationists with the opportunity to monitor continental populations of raptors. They also provide enthusiasts with the chance to enjoy the migration spectacle.

Raptors congregate in large numbers for different reasons. Before migration the swallow-tailed kite (*Elanoides forficatus forficatus*) concentrates in large communal roosting sites in the Big Cypress National Preserve in Florida. Rough estimates suggest that 1 800 to 3 100 birds do so annually after breeding. These concentrations, which are thought to be a response to feeding demands prior to migration, probably include only birds from Florida.

Wintering bald eagles (*Haliaeetus leucocephalus*) congregate in different regions of Oregon (the Bear Valley National Wildlife Refuge), Washington (Nooksack River), and Alaska (Alaska Chilkat Bald Eagle Preserve). The last site offers the most impressive concentrations of this species in the world. Each autumn and winter as many as 3 000 eagles gather along in a six-kilometer stretch of the Chilkat River north of Haines, Alaska to feed on a late run of salmon. Bald eagles often roost together in small areas that protect them from cold weather, but these large aggregations also may have a social function in that younger eagles have a chance to observe and emulate the successful foraging strategies of mature eagles.

New World vultures including black (*Coragyps atratus*) and turkey vultures (*Cathartes aura*) regularly concentrate at traditional communal roosts. This behavior serves as a communication center for vultures searching for new sources of carrion, as well as to protect the birds from predators.

Half of the world's raptors migrate regularly. Africa has at least 61 species, Asia 66, Australia 11, Europe 38, Central and



Every fall, up to 3 000 bald eagles (*Haliaeetus leucocephalus*) congregate on the banks of the Chilkat River to feed on spawned-out salmon. Here, a huge concentration of eagles at Homer, Alaska. Both photos, © Norbert Rosing

South America 33, and the Pacific Islands 29. Thirteen of these species flock by the thousands while migrating. Most super-flocking species are long-distance, trans-equatorial migrants that travel along five global flyways, reaching their greatest concentrations in and around the tropics. Species include turkey vulture (*Cathartes aura*), with a reported maximum flock size of >50 000; Mississippi kite (*Ictinia mississippiensis*) (>1 000); broad-winged hawk (*Buteo platypterus*) (>50 000); Swainson's hawk (*B. swainsoni*) (>50 000); Old World western honey buzzard (*Pernis apivorus*) (>5 000); black kite (*Milvus migrans*) (>1 000); gray-faced buzzard (*Butastur indicus*) (>1 000); Levant sparrowhawk (*Accipiter brevipes*) (>5 000); Chinese goshawk (*A. soloensis*) (>10 000); steppe buzzard (*Buteo vulpinus*) (5 000); lesser kestrel (*Falco naumanni*) (>1 000); Western red-footed falcon (*F. vespertinus*) (>1 000); and eastern red-footed falcon (*F. amurensis*) (>1 000).

More than 100 raptor migration watchsites report movements of >10 000 migrants annually; 18 passage >100 000 migrants; and three counts of >one million. With a springtime average of >half million raptors and an autumn average of >two million, Pronatura-Veracruz River-of-Raptors watchsites in Cardel and Chichicaxtle, Veracruz, Mexico, are the world's most concentrated migration hotspots for raptors. Two thousand kilometers southeast in Caribbean slope Talamanca, Costa Rica, Asociación ANAI's watchsite in the Kéköldi Reserve near Puerto Viejo de Limón, also reports full-season counts of >two million raptors. There also are partial-season counts of >half a million raptors at Ancon Hill, Panama City. All three watchsites are along the Mesoamerican Land Corridor, along which more than five million North American breeding birds of prey migrate between North and South America each spring and autumn. This 32-species flight is dominated by western North American populations of turkey vultures (>1.5 million individuals), and world populations of Mississippi kites (>100 000), broad-winged hawks (>1 million), and Swainson's hawks (>0.5 million).

In the Old World, significant concentration points include the Strait of Gibraltar in Tarifa, Spain (>100 000 individuals representing 17 species annually); the Bosphorus at Istanbul, Turkey, in the eastern Mediterranean (>50 000 individuals, 29 species), and Elat, in southernmost Israel (occasionally >1 million northbound migrants) (20 species). Five species—black kite, Western honey buzzard, Levant sparrowhawk, steppe buzzard, and lesser spotted eagle (*Aquila pomarina*)—pass in numbers representing >1% to >>50% of world population migrants at one or more of these sites.

Farther east, more than one million raptors travel along a 7 000-km system of corridors that stretches from eastern Siberia to peninsular Southeast Asia, and beyond to the Indonesian

archipelago. The 33-species flight is dominated by crested honey buzzards (*Pernis ptilorhynchus*), grey-faced buzzards, Chinese goshawks, and Japanese sparrowhawks (*Accipiter gularis*). The most important concentration point along the flyway is Tanjung Tuan (Cape Rachado), 80 km south of Kuala Lumpur at the closest point in the Malaysian Peninsula to Sumatra, where thousands of crested honey buzzards (>1% of the world population) are seen each autumn. Farther east still, Beidaihe, on the Bay of Bohai in northeastern China some 280 km east of Beijing, reports >10 000 migrants, representing 21 species, including 6 000 pied harriers (*Circus melanoleucus*), or >5% of the world population.

More than half a million raptors representing 19 species migrate along the mainly over-water East-Asian Oceanic Flyway. The flight is dominated by grey-faced buzzards and Chinese goshawks. Important concentration points include Uchiyamatoge, near Nagasaki Japan, where more than 400 000 Chinese goshawks (>>50% of the world population) were counted in September 1999; and along the southeastern part of the Hengch'un Peninsula, in Kenting, southern Taiwan, where 45 000 raptors, including thousands of grey-faced buzzards and tens of thousands of Chinese goshawks, are seen departing for the Philippines each autumn.

Viewed as rapacious and cruel by some and as competitors for game and domestic animals by others, raptors have long been persecuted by people. They also have suffered indirectly from other human actions and the large-scale loss of habitat. Indeed, populations of two-thirds of all species of migratory raptors are threatened, either by habitat loss, environmental contaminants including pesticides, trapping and shooting, or combinations of these. Entire populations of eight species of regular migrants are currently considered globally Threatened by IUCN.

Efforts at well-established migration watchsites indicate that regional and even continental and world populations of raptors can be monitored at these locations. Regionally, watchsites such as these and others along "tributaries" to major migration corridors and flyways can be used to identify critical habitats for migratory species. Locally, watchsites can be used to introduce and build support among local peoples for these charismatic birds, which, in turn, can become flagships for broader conservation issues. The conservation history of the world's oldest continually active watchsite, Hawk Mountain Sanctuary in eastern Pennsylvania, offers one of many examples of how this can happen.

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Above, immature Swainson's hawk (*Buteo swainsoni*)
This is one of the super-flocking migrant raptor species, with maximum flock sizes of 50 000 individuals.
• Patricio Robles Gil/Sierra Madre

On the opposite page,
swarm of broad-winged hawks (*Buteo platypterus*),
Ancon Hill, Panama
• Neal G. Smith/VIREO

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C E M E X

