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Information about North American Raptors

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Bald Eagles
(*Haliaeetus leucocephalus*)

Bald Eagles belong to the family *Accipitridae*, a group of 224 species of hawks, eagles, vultures, harriers, and kites.

Bald Eagles are found only in North America.

Bald Eagles are one of 10 species of sea- or fish-eagles characterized by the lack of feathers on their lower legs and feet.

Bald Eagles were once called white-headed eagles.

Adult **Bald Eagles** have a white head and tail with chocolate-brown body feathers.

Juvenile **Bald Eagles** do not get their adult plumage until their fourth or fifth year.

Bald Eagles often steal prey from other raptors, especially Ospreys (*Pandion haliaetus*).

Bald Eagles are social outside of the breeding season, especially where food is abundant.

Bald Eagles build some of the largest stick nests of any bird. Some of their nests are up to 8 feet across and weigh almost two tons.

Bald Eagles are still threatened by shooting and trapping.

Book List

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Bald Eagles
(Haliaeetus leucocephalus)

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Many of these books are available at the Sanctuary's Mountain Bookstore.

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Golden Eagles
(*Aquila chrysaetos*)

Golden Eagles belong to the family *Accipitridae*, a group of 224 species of hawks, eagles, vultures, harriers, and kites.

Golden Eagles are the largest eagles in North America, and are considered by many to be the most formidable of all of the North American raptors.

Golden Eagles are found in North America, Europe, and Asia.

Although they prefer to eat live prey, **Golden Eagles** will eat carrion.

Golden Eagles occasionally take prey as large as deer and antelope.

Golden Eagles dominate other raptors in disputes over food.

Golden Eagles can soar in winds of up to 100mph.

The territories of **Golden Eagles** sometimes exceed 25 square miles.

Golden Eagles sometimes build several nests before choosing one to use.

Many **Golden Eagles** are electrocuted each year while perch-hunting from utility lines in treeless areas.

Book List

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Golden Eagles
(Aquila chrysaetos)

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Ospreys
(*Pandion haliaetus*)

Ospreys are the only member of the family *Pandionidae*.

Ospreys were once known as “fish hawks” because they usually eat fish.

Ospreys have “M” shaped leading edges to their wings that make them appear gull-winged.

Ospreys add material to their nests each year, and sometimes build massive structures weighing up to 400 pounds.

Ospreys fish by hovering for several seconds before plunging--talons first and wings tucked-- into water.

Ospreys have reversible outer toes and spiny foot pads that help them catch and hold fish.

Ospreys carry fish head first to make them more aerodynamic in flight.
Most fish caught by **Ospreys** weigh about half a pound.

Osprey are sometimes drowned by fish too large for them to carry.

Populations of **Ospreys** declined drastically in the middle of this century because of the misuse of DDT and other pesticides.

Ospreys get their scientific name from *Pandion*, a mythical king of Athens and *haliaetus,* which is Greek for sea eagle.

Ospreys are a cosmopolitan species with populations on all continents except Antarctica.

Book List

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Ospreys
(Pandion haliaetus)

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What are Ospreys and how and when do they migrate at the Sanctuary?

The Osprey–once known as the Fish Hawk–is a gull-winged, eagle-sized, long-legged raptor. Ospreys have reversible outer toes and spiny foot pads that are well adapted to the species fish-catching habits. One of the most cosmopolitan of all raptors, Ospreys are found in coastal areas, large lakes, and rivers on six continents.

Fossil evidence suggests that Ospreys have changed little over the past 10-15 million years. The species' closest living relative among other raptors remains unclear. Most taxonomists place the Osprey in a subfamily or family of its own.

Ospreys are best distinguished in flight by their eagle-like size (the Osprey's wing-span approaches 6 feet) and long and rather narrow wings. Unlike most raptors, Ospreys have wings that are sharply angled at the carpal (wrist) joint. The result is an "M" shaped leading edge to the wing, much like that of many gulls. Despite their largely white heads, Ospreys appear small headed in comparison to both Bald and Golden eagles.

Ospreys are generally white below and dark brown above. The head is white, except for a thick dark-brown eye stripe that proceeds down the sides of the neck and joins the brown back. Females, which are somewhat larger than males, frequently sport a speckled brown necklace across their chest. However, the trait, which also appears in a few males, and is absent in some females, by itself, cannot be used to separate the two. The brown contour feathers of recently fledged juvenile Ospreys are fringed in light cream. The only species with which Ospreys are likely to be confused are large gulls and Bald Eagles (white headed adults only), both of which lack the Osprey's distinctive eye stripe, and dark, banded tail.

Ospreys typically mate for life. Even so, male Ospreys have been known to mate simultaneously with two females, particularly when potential nest-sites are close together and easy to defend. Ospreys build large, conspicuous stick nests, which bird watchers often confuse with those of Bald Eagles. Although Ospreys usually build their nests in snags (trees with broken or dead tops), the species also uses duck blinds, channel markers, and many other man-made structures, wherever natural sites are limiting or absent.

As a result of annual refurbishing, many nests develop into massive structures. Some have been known to weigh as much as 400 pounds. A few have been used continually for decades, often by successive pairs. Because of their size–many nests are more than four feet across–the sides of Osprey nests are, themselves, used as nests by many species of smaller birds including House Sparrows (*Passer domesticus*), House Finches (*Carpodacus mexicanus*), and even Black-crowned Night-Herons (*Nycticorax nycticorax*). One nest visited in southern Florida had several pairs of colonial

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What are Ospreys and how and when do they migrate at the Sanctuary?

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nesting Monk Parakeets (*Myiopsitta monachus*) breeding in it!

Osprey feed almost exclusively on live fish. Most fishing is done "on the wing," rather than from a perch, and many Ospreys hover for several seconds--once they have spotted a fish-- before diving, talons-first and wings tucked into the water. Most dives begin 15 to 120 feet above the water's surface. Diving efficiency ranges from <30% to as much as 90%, depending upon the locale and the experience of the bird involved. Ospreys are most proficient when hunting sluggish bottom feeding fishes in relatively shallow water. High winds that whip the surface of the water into a frenzy diminish the bird's hunting abilities.

Most fishes caught by Ospreys average about half a pound. Even so, some individuals manage to land fishes weighing as much as a pound, which is more than a quarter of the bird's weight. Individuals lucky enough to do so, usually appear to have a difficult time flying away with their catch. Newtonian physics and aerodynamics aside, catching large fishes can be a problem for Ospreys in other ways as well. Bald Eagles frequently pirate Ospreys of their prey, and Ospreys with large fish make excellent targets.

Ospreys, which become sexually mature at three years of age, usually lay three-egg clutches. Migratory populations breed in spring; resident populations, such as those in southern Florida, breed in winter. Despite the fact that Ospreys overwinter in all four of the world's tropical regions (i.e., the Neo-, Afro, Indomalayan, and Australo-tropics), the species only occasionally breeds in the tropical locales.

Throughout the world, Ospreys have long been persecuted by fishermen, many of whom view the species as a threat to their livelihood. More recently, aquaculturists have joined the fray. Earlier in this century, North American and, especially, European hunters shot large numbers of Ospreys on migration. Because they are coastal nesters, breeding Ospreys, are disturbed by burgeoning human populations seeking the same pieces of real estate the birds do. Perhaps more importantly, because the species fishes in waters that humans tend to dump their wastes into, Osprey are particularly vulnerable to environmental contaminants.

Earlier this century, Osprey populations in many parts of North America and Europe fell victim to the widespread use of DDT and other organochlorine pesticides which compromised the species ability to mobilize calcium for their eggshells. Nearly all populations examined for this effect were impacted to some extent. As a result of such contamination, many regional populations ceased breeding entirely. In a few instances, entire populations were eliminated. Although

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What are Ospreys and how and when do they migrate at the Sanctuary?

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many of these same populations are now rebounding following bans on the widespread use of DDT and other organochlorines, others continue to be threatened by other environmental contaminants, including PCBs and dioxin.

Although Osprey population status varies regionally, many populations are recovering from the pesticide threat earlier in the century. Many Ospreys still are shot, especially in the Mediterranean region. Annual rates of passage at the Sanctuary suggest substantial increases since the early 1970s. Indeed, all 10 of the Sanctuary's best flight years have occurred since 1981.

Between 1980 and 1986, 111 Osprey nestlings from the Chesapeake Bay were brought to hacking sites in northeastern Pennsylvania. As a result of this reintroduction effort, Ospreys began breeding in the Commonwealth in 1986. By the mid 1990s, dozens of pairs were breeding in five activity centers scattered across Pennsylvania.

Migration

Ospreys tend to be resident at low latitudes and highly migratory elsewhere. Their dependence on live fish severely restricts their ability to overwinter in regions where fishes descend to deeper warmer waters to avoid colder surface waters, or in areas where bodies of water freeze.

Ospreys, which comprise 2-3% of the Sanctuary's annual count of raptors, glide, soar, and, often flap, while migrating. The species occasionally uses thermals for gaining lift. Although Ospreys do not "flock" on migration, many individuals pass the North Lookout in loose assemblages of two or more birds, well in sight of one another.

Although most raptors avoid water crossing whenever possible, Ospreys do not. Many fly directly across the Caribbean en route to South America, without island-hopping, and a few are suspected of flying directly to South America from the mid-Atlantic Coast of eastern North America. Osprey also migrate directly across the Mediterranean Sea.

In both North America and Europe, adult Ospreys precede juveniles on autumn migration.

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What are Ospreys and how and when do they migrate at the Sanctuary?

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Vital statistics at Hawk Mountain

Mean annual count: 342
Highest annual count (year): 872 (1990)
Lowest annual count (year): 17 (1934)
Highest one-day count: 175 on 23 Sept. 1989
Seasonal mid-point of migration: 19 September
Early and late dates (year): 15 Aug. (1984) and 4 Dec. (1991)
Number of days it takes the middle 50% of the flight to pass: 17
Number of days it takes the middle 90% of the flight to pass: 42
Maximum rate of passage: 1.4 birds per hour in late September

Points of interest

Seventy or more Ospreys have been seen on single days eight times at Hawk Mountain Sanctuary. In late September, the daily chance of seeing at least one Osprey at the North Lookout peaks at 89%.

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American Kestrels
(*Falco sparverius*)

American Kestrels belong to the family *Falconidae*, a group of 60 species of caracaras, falconets, pygmy falcons, forest-falcons, and falcons.

American Kestrels are about the size of a Blue Jay.

American Kestrels were once called sparrow hawks.

American Kestrels occur from Tierra del Fuego in southern South America, to the boreal forests of Alaska and Canada.

American Kestrels occur only in the New World.

Because of their small size and habit of perching on utility lines, **American Kestrels** are often mistaken for Mourning Doves.

Male **American Kestrels** have blue-gray wings; females have brown wings.

Male and female **American Kestrels** can be told apart by their plumage as early as three weeks of age.

American Kestrels do not build their own nests, but instead nest in cavities made by other birds, and in nestboxes built by humans.

Some **American Kestrels** migrate long distances while others do not migrate at all.

In North America, male **American Kestrels** winter farther north than do female kestrels.

In winter, female **American Kestrels** hunt in more open, less wooded areas, than do males.

Hawk Mountain Sanctuary has been erecting nestboxes for **American Kestrels** in the Kempton Valley since the early 1950s.

Book List

Raptor Bites

American Kestrels
(*Falco sparverius*)

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Merlins
(*Falco columbarius*)

Merlins belong to the family *Falconidae*, a group of 60 species of caracaras, falconets, pygmy falcons, forest-falcons, and falcons.

Merlins were once known as pigeon hawks because their flight resembles that of pigeons (*Columbiformes*).

In medieval falconry, **Merlins** were used by ladies.

Both Catherine the Great of Russia and Mary Queen of Scots flew **Merlins**.

Merlins have slightly larger wingspans than American Kestrels, and weigh up to three times as much as kestrels.

In North America, juvenile **Merlins** occasionally migrate in loose flocks, sometimes together with Sharp-shinned Hawks.

Each **Merlin** eats as many as 900 birds a year.

Few **Merlins** live to be five years or more, in part because they often collide with cars, buildings, and trees.

Merlins sometimes feed on birds such as pigeons, which are twice their size.

Larger raptors sometimes prey on **Merlins**.

The number of **Merlins** living in urban areas has increased substantially in the last 30 years.

Book List

Raptor Bites

Merlins
(*Falco columbarius*)

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Peregrine Falcons
(*Falco peregrinus*)

Peregrine Falcons belong to the family *Falconidae*, a group of 60 species of caracaras, falconets, pygmy falcons, forest-falcons, and falcons.

Peregrine Falcons are found on every continent except Antarctica.

There are 22 subspecies of **Peregrine Falcons**.

Peregrine Falcons once were called duck hawks.

The word "**peregrine**" is Latin for migrant or wanderer.

Many falconers consider female **Peregrine Falcons** to be the quintessential falcon.

Male **Peregrine Falcons** are called tiercels.

Male **Peregrine Falcons** weigh as little as 450 grams; females weigh as much as 1,500 grams.

Peregrine Falcons cruise in level flight at 40-55 mph and stoop at up to 200 mph.

Peregrine Falcons sometimes stalk their prey on foot after prey have sought cover.

European and North American populations of **Peregrine Falcons** declined in the middle of the 20th Century as a result of the misuse of DDT and other pesticides.

Populations of **Peregrine Falcons** have recently rebounded in both North America and Europe.

Book List

Raptor Bites

Peregrine Falcons
(*Falco peregrinus*)

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Gyrfalcons
(Falco rusticolus)

Gyrfalcons belong to the family *Falconidae*, a group of 60 species of caracaras, falconets, pygmy falcon, forest-falcons, and falcons.

Gyrfalcons are the largest of all falcons.

Gyrfalcons are the most northern of all diurnal raptors.

Gyrfalcons are found in both arctic and sub-arctic regions in the New and Old World.

Many female **Gyrfalcons** weigh 50% or more than their mates.

Gyrfalcons have relatively short, rounded wings for falcons.

Gyrfalcons have several different plumages, ranging from dark morphs to primarily white morphs.

Gyrfalcon chicks are well insulated with down to allow them to survive in polar regions.

Gyrfalcons often stoop from great heights and are able to gain altitude faster than many other falcons.

Gyrfalcons aggressively defend their nests from potential enemies.

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Gyrfalcons
(Falco rusticolus)

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Turkey Vultures
(*Cathartes aura*)

Turkey Vultures belong to the family Cathartidae, a group of 7 species of New World Vultures.

Turkey Vultures are so names because their red, featherlass heads resemble those of Wild Turkeys (*Meleagris gallopavo*).

Turkey Vultures may be more closely related to storks than other raptors, including Old World Vultures.

Although **Turkey Vultures** feed almost exclusively on carrion (dead animals), they sometimes take live prey.

Turkey Vultures are the most migratory of all of the New World Vultures.

The **Turkey Vulture's** plumage is dark brown, not black.

When flying, **Turkey Vultures,** hold their wings in a "V" above their backs, creating a slight dihedral that stabalizes their flight.

Turkey Vultures often roost in groups of several hundred birds.

Turkey Vultures have an acute sense of smell, which enables them to find carrion by both smell and sight.

Turkey Vultures communicate vocally in hisses and grunts.

Nestling **Turkey Vultures** projectile vomit to defend themselves.

Turkey Vultures have weak feet, and are unable to carry off their carrion.

Book List

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Turkey Vultures
(*Cathartes aura*)

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What are Turkey Vultures and how and when do they migrate at the Sanctuary?

The Turkey Vulture is a carrion-eating scavenger named for the fact that its head, in being both featherless and red, resembles that of a Wild Turkey (*Meleagris gallopavo*). The species, which rarely flaps its wings once it is above the canopy, frequently rocks gently from side-to-side while soaring above forested and open habitats, searching for dead prey. Turkey Vultures occur, either as migrant breeders, year-round residents, or both, throughout most of North America, north to southern Canada, and south into most of South America. They also occur on the Falkland Islands. The species, along with six other species of New World vultures, is considered by some experts to be more closely related to storks than to any other raptors, including Old World Vultures.

One of the species most distinguishing characteristics in flight is that it frequently holds its wings in a "V" above its back, creating a "slight dihedral," presumably to stabilize itself while soaring in small thermals (pockets of hot, rising air). The Turkey Vulture's featherless (except for some dark hairlike bristles) head, which is typical of vultures, gives the eagle-sized bird a decidedly small-headed appearance, in sharp contrast to the flight profiles of most raptors.

Although Turkey Vultures are generally dark overall—indeed many first-time Sanctuary visitors describe them as big, black birds—their feathers actually are brown and brownish gray, a field mark that, in good light, helps to separate the species from the Black Vulture, North America's other common carrion eating raptor. Juvenile Turkey Vultures have greyish, rather than reddish heads, and dark bills, traits they maintain for up to a year after fledging. The dark-tipped bill of adult Turkey Vultures is bone colored. Although it was once believed that the number of wart-like tubercles festooning the heads of adult vultures increased in number with age, this is no longer believed to be so.

Because Turkey Vultures are large birds with wing-spans approaching six feet, they are sometimes misidentified as eagles. Both species of North American eagles can be distinguished from vultures by the oversized appearance of their fully feathered heads and massive bills. Furthermore, eagles rarely soar in the company of other eagles, while both species of vultures regularly do so. Indeed a rising kettle of raptors, especially outside of spring and autumn migration, is more than likely to consist of several Turkey Vultures, Black Vultures, or a mixed flock of both species soaring together.

Turkey Vultures nest in caves, on cliff ledges, and among rocks and fallen logs on the forest floor. At least some individuals appear to pair for life. Like most raptors Turkey Vultures are monogamous. "Follow-flights," in which one member of the pair precisely tracts the flight of its mate at an

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What are Turkey Vultures and how and when do they migrate at the Sanctuary?

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altitude of 60-100 feet for up to several hours, frequently proceeds copulation.

Outside of the breeding season, Turkey Vultures roost communally, sometimes in association with Black Vultures. Communal roosts can include as many as several hundred birds. Recent studies involving radio-telemetered individuals suggest that many traditional roosts are visited by numerous individuals, indeed, far more than their maximum numbers would indicate, suggesting that communal roosts function as vulture motels, more than as regular homesites.

Turkey Vultures search for carrion by flying low over the ground or vegetation. Their ability to locate food by smell, as well, as by sight–which was suspected even in Audubon's day–was confirmed earlier this century in a series of controlled experiments in which individuals were able to locate concealed carrion. Although the species almost always feeds on dead animals, it does, on occasion, take live prey as well, especially large insects and vulnerable young vertebrates. Turkey Vultures appear to prefer fresh meat, but will feed on putrefied flesh, and, when hard pressed, vegetables.

Turkey Vultures have been trapped and shot in Texas and elsewhere in the United States by farmers and ranchers who believed the species' carrion-eating habits made it capable of polluting waters and transmitting diseases. The species is, however, resistant to both oral and injected doses of botulism, and, overall, appears to be relative resistant to many vertebrate infections; which is not especially surprising insight of its lifestyle. Cherokee Indians drank its blood in hopes of immunizing themselves to infectious diseases.

Turkey Vultures, which have expanded their range northward in to southern Canada this century, appear to be increasing in many portions of their North American range. Today, a major mortality factor appears to be collisions with automobiles; a result of the species frequently feeding on road-killed prey. Counts at Hawk Mountain Sanctuary's North Lookout suggest a stable population regionally.

Migration

Turkey Vultures are partial migrants. Most individuals migrate in flocks of several individuals to several thousands birds. In southern North America and in Central America, multi-thousand bird flocks are a common phenomenon on both south- and north-bound migration. More than a million Turkey Vultures are seen migrating south each autumn along the coastal plain of Veracruz, Mexico.

Turkey Vultures soar extensively on migration. Although the species uses both thermals and updrafts, Turkey Vultures appear to be especially dependent on the

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What are Turkey Vultures and how and when do they migrate at the Sanctuary?

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latter during southbound migration in the central Appalachians of Pennsylvania. The extent to which male and female, and young and adult birds differ in their migratory habits remains largely unknown. Although we know little regarding the extent to which North American migrants interact with South American residents living the areas the former overwinter in, recent studies in Venezuela suggest that such interactions may be extensive.

Counts at Hawk Mountain Sanctuary are often made difficult by the daily movements of "local" Turkey Vultures, which maintain several roost sites within 10 miles of the North Lookout through most of the autumn migration.

Vital statistics at Hawk Mountain

(Note: Annual counts are limited to data collected between 1990 and 1995)
Mean annual count: 143
Highest annual count (year): 190 (1994)
Lowest annual count (year): 84 (1992)
Highest one-day count: 80 on 24 Oct. 1994
Seasonal mid-point of migration: 29 Sept.
Early and late dates (year): 16 Aug. (1994) and 13 Dec. (1987)
Number of days it takes the middle 50% of the flight to pass: 47
Number of days it takes the middle 90% of the flight to pass: 60
Maximum rate of passage: 0.26 birds per hour in early Nov.

Points of interest

Turkey Vultures almost always migrate past Hawk Mountain in flocks of several to several dozen birds. In early November, the daily chances of seeing at least one Turkey Vulture at the North Lookout peaks at 17%.

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Black Vultures
(*Coragyps atratus*)

Black Vultures belong to the family *Cathartidae*, a group of 7 species of New World Vultures.

Black Vultures are the heaviest vultures in the Eastern United States.

Black Vultures, which rarely flap in flight, have broad plank-like wings that allow them to soar in small thermals.

Black Vultures search for carrion exclusively by sight.

As a result of the Turkey Vulture's acute sense of smell, **Black Vultures** often follow Turkey Vultures to find food.

Black Vultures sometimes take live prey.

Black Vultures usually roost together in family units.

Black Vultures nest on the ground and on the floors of abandoned buildings.

The range of **Black Vultures** has been expanding northwards since the 1950s.

Raptor Bites

Book List

Black Vultures
(*Coragyps atratus*)

Bent, A.C. 1937-1938. *Life histories of North American birds of prey*. (vol.1-2). New York: Dover.

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Education, Hawk Mountain Sanctuary,
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Kempton, PA 19529.
Web: www.hawkmountain.org

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Sharp-shinned Hawks
(Accipiter striatus)

Sharp-shinned Hawks belong to the family *Accipitridae*, a group of 224 species of hawks, eagles, vultures, harriers, and kites.

Sharp-shinned Hawks are named for their sharply keeled, featherless lower legs.

Sharp-shinned Hawks are the smallest of North America's three accipiters.

Male **Sharp-shinned Hawks** are smaller than females. In fact, many female Sharp-shins are closer in size to male Cooper's Hawks (*Accipiter Cooperii*) than they are to male **Sharp-shinned Hawks**.

Sharp-shinned Hawks hunt by stealth, and almost always on the wing.

Few **Sharp-shinned Hawks** live to be five or more years of age, in part because they often collide with cars, buildings, and trees.

Sharp-shinned Hawks are fairly common in urban areas where they often prey on birds at bird feeders.

Juvenile **Sharp-shinned Hawks** often take a different route on migration than do adult **Sharp-shinned Hawks**.

The wintering of **Sharp-shinned Hawks** has expanded northward in eastern North America in the last 20 years.

Raptor Bites

Book List

Sharp-shinned Hawks
(Accipiter striatus)

Bent, A.C. 1937-1938. *Life histories of North American birds of prey*. (vol.1-2). New York: Dover.

Brauning, D.W. 1992. *Atlas of breeding birds in Pennsylvania*. Pittsburgh: University of Pittsburgh Press.

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Raptor Bites

What are Sharp-shinned Hawks and how and when do they migrate at the Sanctuary?

The Sharp-shinned Hawk is a short-winged, long-tailed, bluejay-sized denizen of forested regions throughout much of North, Central, and northern South America. A scaled-down version of the Cooper's Hawk, this consummate "bird hawk" frequents back-yard bird feeders, as well as the interiors of large forests. Sharp-shinned Hawks belong to the largest genus of raptors, *Accipiter*, a group of 50 birds of prey characterized by extreme sexual size dimorphism (in some species, females are twice as large as males), long legs and toes, long rudder-like tails, and short, rounded wings.

Adult Sharp-shinned Hawks are gray to gray-brown above, and reddish-brown barred below, with whitish throats, and an alternately dark- and light-gray, barred tail. Juveniles are brownish above and streaked—not barred—brown on whitish, below. Adults have orange or red eyes, juveniles have yellow eyes. Males are decidedly smaller than females, so much so that many female Sharp-shinned Hawks are closer in size to male Cooper's Hawks, than to males of their own species.

Sharp-shinned Hawks are best distinguished from Cooper's Hawks, by their relatively smaller heads, square-tipped tails, decidedly more buoyant (some would say, unstable) flight, and smaller size, overall. Unfortunately, while the latter is of considerable use in separating male Sharp-shinned Hawks from considerably larger female Cooper's Hawks, separating female sharpies from male Cooper's Hawks by size alone is challenging. A comparison of the two species' weights and measures suggests why the task is so difficult. Head-to-tail and body mass measurements for male and female "sharpies" and "coops" are as follows: 9-11, 11-13, 14-16, and 16-19 inches; and 3-4, 5-8, 10-14, and 17-24 ounces, for male sharpies, female sharpies, male coops, and female coops, respectively. Because of the tight progression in size, one the most difficult calls the Sanctuary's official counter makes on North Lookout is that of distinguishing female Sharp-shinned from male Cooper's Hawks. Experience, a genuine "gestalt" approach, and more than a bit of luck, are called for at such times.

Sharp-shinned Hawks build modest stick nests, similar to, but larger than those of many songbirds. Like many other forest-dwelling raptors, sharpies typically line their nests with greenery, possibly because insecticidal chemicals in the vegetation help control nestling parasites. The species frequently nests in dense stands of young conifers, usually 12 to 36 feet above the ground. Most females lay 4- or 5-egg clutches. Nestlings, which fledge within about 27-30 days, are fed by their parents for several weeks thereafter. Reproductive success, ranges from 60 to 100% depending upon location and prey availability.

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What are Sharp-shinned Hawks and how and when do they migrate at the Sanctuary?

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Sharp-shinned Hawks feed extensively upon small songbirds, including sparrows, finches, warblers, thrushes, vireos, and swallows, taking at least 20 families of birds as prey. Sharpies also take a few small mammals, frogs, and insects, but in decidedly lower numbers, overall.

Sharp-shinned Hawks hunt by stealth, and almost always on the wing. The lightening-fast speed at which they fly through their forested ecosystems is not without cost. Their rudder-like tails aside, sharpies frequently collide with unforgiving trees, and other hard surfaces, including windows, and automobiles. As a result of these and other sources of mortality, few Sharp-shinned Hawks live to be five or more years of age. Indeed, most have died within a year and a half of fledging.

Many bird watchers initially encounter their first sharpie outside a backyard window, when seemingly out of nowhere the quintessential bird-hawk appears in a flash, stalls over a birdfeeder just long enough to snatch its unwilling prey, and then disappears rapidly around the corner of the house.

Although the extent to which the species depends upon "feeder birds" as a source of prey remains unknown, for some sharpies, at least, such easy pickings appear to comprise the bulk of the bird's diet. Many individuals overwintering in the Kempton Valley southeast of Hawk Mountain, for example, fly from farm house to farm house, circling each in turn, trying to surprise local songbirds attracted to the area's growing number of backyard birdfeeders. Published reports of sharpies using buildings as cover for sneak attacks date from the 1920s. More recently, results from Cornell University's Project Feederwatch indicate that in many parts of the species' range, Sharp-shinned Hawks take more birds at birdfeeders than any other predator, including the domestic cat.

Earlier in this century the species' habit of feeding on songbirds cost many sharpshins their lives. As recently as the 1940s, Sharp-shinned Hawks were still unprotected in Pennsylvania, and many early 20th Century descriptions of the species focused on the sharpies supposed role as a local exterminator of songbirds. Typical of the genre is this description in State Ornithologist's George M. Sutton's "An introduction to the birds of Pennsylvania" published in 1928:

> *"The sharp-shin is the enemy of all small birds. It is swift in flight and skulks along among the bushes, pouncing upon its victims suddenly. Near the nest of a pair of these birds located at McDonald Water Works, Washington County, there were no small birds–they had probably all been killed or driven out by the Sharp-shins."*

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Raptor Bites

What are Sharp-shinned Hawks and how and when do they migrate at the Sanctuary?

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Today, the growing realization that all native birds–predator and prey alike–play essential roles in natural ecosystems, and that single-species management is an outmoded and ineffectual conservation technique, are helping to protect sharpies and other bird-eating hawks, along with their songbird prey, in fully functional ecosystems, similar to those that produced these species in the first place.

Migration

Sharp-shinned Hawks are partial migrants. Although the species migratory habits have been studied in considerable detail, much remains to be learned regarding the factors that determine why the species migrates as it does. Most individuals leave the species northern breeding range in the boreal forest of Canada each fall for warmer climes farther south. In general, juveniles precede adults on migration, with males preceding females in each age class. In the northeastern United States, juveniles are far more likely to use the coastal flyway than are adults. Farther inland, the flight consists of a relatively equal mix of adult and juvenile birds.

The reason for the age-specific difference in flight lines remains unclear. Some have suggested that juveniles are more likely to be blown off the preferred inland course, than are adults, while others have suggested that juveniles follow the coastal route, which is also favored by many songbirds, because its affords a better prey base during fall migration.

Many of the birds sighted at Cape May Point in southernmost New Jersey, stop to feed before continuing south across the Delaware Bay. Others back-track along the eastern edge of the bay before making a substantially narrower water crossing farther north. Still others fly directly over the bay en route to points farther south.

Declining counts of Sharp-shinned Hawks at a number of mid-Atlantic watch sites during the 1980s and early 1990s have been correlated with increased numbers of birds on Christmas Bird Counts farther north, suggesting that the species may now be wintering farther north. Although the reasons for the shift remain speculative, a series of milder winters, coupled with increasing numbers of bird feeders in the Northeast, appear to be playing a role in this migratory short-stopping.

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What are Sharp-shinned Hawks and how and when do they migrate at the Sanctuary?

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Vital statistics at Hawk Mountain

Mean annual count: 4,246
Highest annual count (year): 10,612 (1977)
Lowest annual count (year): 1,259 (1964)
Highest one-day count: 2,475 on 8 Oct. 1979
Seasonal mid-point of migration: 7 October
Early and late dates (year): 15 Aug. (1948, 1950, 1990, 1993, 1994) and 13 Dec. (1986, 1993)
Number of days it takes the middle 50% of the flight to pass: 14
Number of days it takes the middle 90% of the flight to pass: 45
Maximum rate of passage: 20.4 birds per hour in early October

Points of interest

Sharp-shinned Hawks are especially abundant on the Sanctuary's North Lookout for several days following the passage of a cold front. At such times sharpies are able to take advantage of mountain updrafts created by strong northwesterly winds. In early October, the daily chance of seeing at least one Sharp-shinned Hawk at the North Lookout peaks at 98%.

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Cooper's Hawks
(*Accipiter cooperii*)

Cooper's Hawks belong to the family *Accipitridae*, a group of 24 species of hawks, eagles, vultures, harriers, and kites.

Cooper's Hawks were named for William Cooper, a New York scientist whose son James is the namesake of the Cooper Ornithological Society.

Cooper's Hawks closely resemble, but are larger than Sharp-shinned Hawks (*Accipiter striatus*).

Cooper's Hawks eye color changes from bluish-gray in nestlings, to yellow, in young adults and then to red in older adults.

Female **Cooper's Hawks** often weigh 35% more than their mates.

Cooper's Hawks were highly persecuted earlier this century, when an estimated 30-40% of all first year birds were shot annually.

Although they are common in some areas in the west, **Cooper's Hawks** were listed as endangered, threatened, or of special concern in 16 eastern states as recently as the early 1990s.

Raptor Bites

Book List

Cooper's Hawks
(*Accipiter cooperii*)

Bent, A.C. 1937-1938. *Life histories of North American birds of prey*. (vol.1-2). New York: Dover.

Brauning, D.W. 1992. *Atlas of breeding birds in Pennsylvania*. Pittsburgh: University of Pittsburgh Press.

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What are Cooper's Hawks and how and when do they migrate at the Sanctuary?

The Cooper's Hawk is a short-winged, long-tailed, crow-sized woodland hawk found throughout most of the forested regions of southern Canada, the United States, Mexico, Guatemala, and Belize. The species is a summer resident in southern Canada and the northern tier of the United States, a winter visitor in much of the southernmost United States and Mexico south, and is a year-round resident elsewhere in its range. The closely related Gundlach's Hawk (*A. gundlachi*) is restricted to the island of Cuba. The Cooper's Hawk is named for William C. Cooper, a New York scientist.

A scaled-up version of the Sharp-shinned Hawk, the Cooper's Hawk regularly preys on both small birds and mammals, as well as reptiles and amphibians. Female Cooper's Hawks are approximately one third larger than their male counterparts. Like Sharp-shinned Hawks and Northern Goshawks, Cooper's Hawks belong to the genus Accipiter, a group of 50 species of widely distributed hawks, characterized by extreme sexual size dimorphism, longish legs and toes, long, rudder-like tails, and short, rounded wings.

Western Cooper's Hawks are substantially smaller than their eastern counterparts. Adults are brownish to blue-gray above, and barred rufous below. Adult males tend to be brighter and less brownish, than adult females. Juveniles are brown, mottled with white above and whitish with brown streaking below. The longish tail, which is rounder and more prominently white tipped than that of Sharp-shinned Hawks, is barred with alternating light and dark gray in adults and brown in juveniles. The dark-gray crown of adults is noticeably darker than the somewhat crested nape.

Distinguishing male Cooper's Hawks from female Sharp-shinned Hawks is one of the most difficult calls official counters on the Sanctuary's North Lookout make. Aside from a modest difference in size—male Cooper's Hawks measure 14-16 inches from head to tail, and weigh 10-14 ounces, compared with 11-13 inches and 5-8 ounces, respectively, for female sharpies. In addition, male Cooper's Hawks have more rounded tails, and a more elongated look, than do female sharpshins. The terminal whitish tailband is proportionately wider in Cooper's Hawks than in sharpies; and the crown of Cooper's Hawks is decidedly darker than that of the nape. On migration, the Cooper's Hawk is noticeably more stable in flight than its smaller cousin, and its head projects farther in front of the leading edge of its wings than does that of the sharpshin. In spite of those differences, distinguishing the two species in flight has been known to confuse even the most experienced hawkwatcher.

Cooper's Hawks nest in deciduous, mixed and evergreen forests, typically in older and taller trees than do Sharp-shinned Hawks. Nests, constructed of sticks, are usually 25

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What are Cooper's Hawks and how and when do they migrate at the Sanctuary?

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to 50 feet off the ground, and are 25 to 30 inches across and 6-10 inches deep. Although Cooper's Hawks occasionally build their nests in isolated trees, most nests are built in woodlots or extensive forests.

The species usually lays 3- or 4-egg clutches. The eggs, which are cobalt blue when laid, arrive at 2- or 3-day intervals. Eggs hatch after 34 to 36 days of incubation. Males fledge at 30 days of age, females at 34 days. Nest predation, when it occurs, frequently comes in the form of raccoons (*Procyon lotor*) and Great Horned Owls (*Buteo virginianus*).

Like other North American Accipiters, Cooper's Hawks rely on concealment and a sneak attack to catch their prey. A favorite hunting technique, which is responsible for one of the species colloquial names--the blue darter-- involves flying close to the ground, while using shrubs for cover, before using a sudden burst of speed to overcome unsuspecting prey. In most instances prey are snatched with both feet. Like the Northern Harrier, Cooper's Hawks sometimes drown their prey. Prey are usually consumed head first.

Because the species sometimes includes poultry in its diet, the Cooper's Hawk was heavily persecuted during the first half of the 20th Century. Consider, for example, this passage from Sutton's "Birds of Pennsylvania," published in 1928:

> "*The Sharp-shinned and Cooper's hawks, both bird killers, are fairly common and are to be rated as our most objectionable birds of prey. They are not protected in Pennsylvania.*"

Given such attitudes, it is not surprising that one estimate suggests that from 28% to 47% of all first-year birds were killed by shooters annually in the 1930s. Many Cooper's Hawks also were pole trapped during this time. In many parts of the country the species received little protection until well into the 1960s. Today shooting appears to be a minor threat, and Cooper's Hawks have begun to breed in suburban areas.

Cooper's Hawks are considered common in many areas of the western United States, and the species appears to be increasing in several parts of its range, including the northeastern United States. The species was listed as Endangered, Threatened or of Special Concern in 16 eastern States in the early 1990s.

Much remains to be learned regarding the population status of this secretive woodland species.

Numbers of Cooper's Hawks have increased substantially at Hawk Mountain recently, with more than twice as many birds being seen from 1990 through 1995 than in earlier years.

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What are Cooper's Hawks and how and when do they migrate at the Sanctuary?

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Migration

Like most accipiters, Cooper's Hawks usually migrate alone. Major flights occur on the several days that follow the passage of a cold front, typically during periods of brisk northwesterly winds. Although the species frequently soars on migration, it is also known to engage in considerable flapping flight.

As is true of Sharp-shinned Hawks, juvenile Cooper's Hawks precede adult on migration, a phenomenon some have ascribed to the former's need to closely track the migration of their avian prey. Males generally precede females in both age classes.

Vital statistics at Hawk Mountain

Mean annual count: 283
Highest annual count (year): 786 (1989)
Lowest annual count (year): 61 (1964)
Highest one-day count: 204 on 8 Oct. 1981
Seasonal mid-point of migration: 8 Oct.
Early and late dates (year): 15 Aug. (1990) and 15 Dec. (1991)
Number of days it takes the middle 50% of the flight to pass: 14
Number of days it takes the middle 90% of the flight to pass: 29
Maximum rate of passage: 1.4 birds per hour in early October

Points of interest

The seasonal passage of Cooper's Hawks and Sharp-shinned Hawks are nearly identical at Hawk Mountain Sanctuary. In early October, the daily chance of seeing at least one Cooper's Hawk at the North Lookout peaks at 86%.

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Northern Goshawks
(*Accipiter gentilis*)

Northern Goshawks belong to the family *Accipitridae*, a group of species of hawks, eagles, vultures, harriers, and kites.

Northern Goshawks are the largest and least sexually dimorphic accipiters in North America.

Northern Goshawks, the most widely distributed of all accipiters, are found in Europe, Asia, Japan, and Northern Africa, as well as in North America.

Northern Goshawks are revered in many cultures as a symbol of strength.

The image of a **Northern Goshawk** adorned the helmet of Attila the Hun.

Because it feeds on grouse, ducks, rabbits, and hares, the **Northern Goshawk** was once called “the cook’s hawk.”

Northern Goshawks are ferocious defenders of their nests.

Northern Goshawks feed on many other raptors, including Merlins (*Falco columbarius*) and American Kestrels (*Falco sparverius*).

Although southern populations of **Northern Goshawks** are largely sedentary, northern populations are irruptive migrants that invade the United States when prey populations plummet in Canada.

Northern Goshawks are often used in falconry.

Earlier this century, The Pennsylvania Game Commission had a five-dollar bounty on **Northern Goshawks**.

Book List

Raptor Bites

Northern Goshawks
(*Accipiter gentilis*)

Bent, A.C. 1937-1938. *Life histories of North American birds of prey*. (vol.1-2). New York: Dover.

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What are Northern Goshawks and how and when do they migrate at the Sanctuary?

The Northern Goshawk is North America's largest and least sexually dimorphic accipiter. The secretive "gray ghost" of mature forests occurs throughout southern Canada, the northern United States and the mountainous west (including northwestern Mexico). Outside of North America, the Northern Goshawk, which is the most widely distributed of all accipiters, occurs throughout much of forested Europe, northern Asia, and Japan, as well as in extreme northwestern Africa. Goshawks vary considerably in size and plumage across their range.

Northern Goshawks, are massive, powerful, broad-breasted accipiters with wide, rounded wings, and longish tails. Overall, the species approximates the size and body mass of a Red-tailed Hawk. The Northern Goshawk's deservedly fierce reputation is accentuated in adult plumages by a dramatic white superciliary line, or eyebrow, and black crown, which, together with its red eyes, creates a striking appearance. Juveniles have brown heads, less distinct pale eyebrows, and yellow irises. Adults are slaty blue above and pale blue-gray with black barring, below. Adult tails are barred, alternately, dark and light gray. The feathers at the underside base of the tail are white and conspicuously fluffy. Juveniles are brownish above, with considerable white mottling, and cream-colored to whitish below, overlaid with thick brown streaking. Juveniles have alternately dark and light brown barred tails. As is true of most accipiters, females are larger than males.

Northern Goshawks are opportunistic and eclectic predators. In North America the species feeds upon many species of birds and mammals, including grouse, ducks, merlins, kestrels, many species of large and small songbirds, snowshoe hares, cottontails, weasels, woodchucks, squirrels and many other small rodents; as well as snakes. The goshawk regularly preyed upon the now extinct Passenger Pigeon (*Ectopistes migratorius*). The species' broad diet is almost certainly related to its enormous geographic range. In the unenlightened and thankfully bygone era of "good" and "bad" hawks, the goshawk's penchant for including many game species in its diet led State of Pennsylvania Ornithologist, George Miksch Sutton, to write in his 1928 "Birds of Pennsylvania" that the bird is "our most savage destroyer of small game."

Northern Goshawks, like Cooper's Hawks, tend to hunt within forest canopies, as well as along forest openings. The species hunts from a perch more frequently than do smaller accipiters. Goshawks are typical sit-and-wait predators, attacking from short distances, with tremendous bursts of speed. Once pursuit begins, individuals often continue their attack on foot, crashing through brush and bramble in an attempt to secure fleeing prey. In the word's of John

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What are Northern Goshawks and how and when do they migrate at the Sanctuary?

continued ...

James Audubon, the Goshawk:

> *"... sweeps along the margins of the fields, through the woods, and by the edges of ponds and rivers, with such speed as to enable him to seize his prey by merely deviating a few yards from his course, assisting himself on such occasions by his long tail, which, like a rudder, he throws to, the right or the left, upwards or downwards, to check his progress, or enable him suddenly to alter his course."*

Throughout most of North America, goshawks nest almost exclusively in mature forests, typically in larger trees than do Cooper's and Sharp-shinned hawks. Nests are usually built close to the main trunk, usually 20 to 75 feet above the ground. In Alaska, the species is known to nest on rocky cliffs. Females do most, if not all, of the nest building. As is true of many accipiters, the nest is lined with bark, and greenery is added to the cup throughout incubation and brooding. Most nests are 10 to 20 inches deep and 18 to 36 inches across.

The species normally lays 3-4 eggs, which are incubated for 35-38 days each. Nestlings, are independent 70-90 days after hatching. Young males precede young females to independence by as much as a week. Failure rates can be quite high, with as many as 40% of all nesting attempts failing in some years. Successful nests usually fledge between 1.5 and 3 young.

Goshawks are well known for their ferociously effective nest defence. Consider, for example the following account from Arthur Cleveland Bent "Life Histories of North American birds of Prey" published in 1937:

> *"Mr. Woods visited the [goshawk nest near Huntington, Massachusetts] before the eggs had hatched and 'found the female goshawk in very bad humor and hostile; she making four attacks on him while he was at the nest, coming at full speed and not uttering a sound.' Woods was able to protect himself in a degree by pulling his coat over his head and dodging, but eventually the hawk lacerated him quite badly on the upper part if one hand and wrist... Later on the female was shot by Mr. Sakes after she had attacked him on three different days while he was fishing in a nearby creek."*

Perhaps not surprisingly, the goshawk's ferocious behavior, together with its ability to take small upland game and poultry, led game officials in Pennsylvania to place a five-dollar bounty on the species earlier this century. It was this bounty, together with game laws that prohibited the shooting of game species on Sundays, that led to the massive slaughter of thousands of unprotected raptors on weekends along the Kittatinny Ridge in the 1920s and early 1930s.

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What are Northern Goshawks and how and when do they migrate at the Sanctuary?

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Although Northern Goshawks are considered uncommon in many regions of North America, especially in the far West, recent evidence suggests that the species is doing quite well in many portions of its North American range.

Because the species is an irruptive migrant, whose migration counts at the Mountain often fluctuate dramatically from year to year, long-term trends in populations are difficult to determine, even so Sanctuary counts during the first half of the 1990s suggest that the species appears to be holding its own, at least in northeastern North America.

Migration

The Northern Goshawk is a solitary and particularly irruptive migrant. Breeding populations in southern portions of the goshawk's range tend to be sedentary. Although some northern populations are thought to migrate on a regular basis, others are thought to be sedentary when snowshoe hares (*Lepus americanus*) are abundant, and highly migratory only when hares are scarce. Resulting periodic "invasions" of Northern Goshawks into the eastern United States occur at approximately ten-year intervals; usually, in loose synchrony with fluctuations in populations of snowshoe hares. Although an overall relationship between hare abundance and goshawk migration is currently well established, details of the phenomenon await additional study.

In northern regions, fall migration begins in late August and September, with juveniles generally preceding adults, and males preceding females. As is true of most accipiters, goshawks tend to migrate soon after cold fronts have passed through a region, usually along mountain ridges. At a watchsite in southeastern Wisconsin, goshawk flights peaked in mid morning. A female goshawk banded in Minnesota in September and recovered in Louisiana in late November appears to have traveled at a rate of approximately 20 miles a day. Spring migration, which is little studied, appears to begin as early as February.

In western North America, where the species is more lightly wing-loaded, goshawks appear to be more migratory, overall.

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What are Northern Goshawks and how and when do they migrate at the Sanctuary?

continued ...

Vital statistics at Hawk Mountain

Mean annual count: 69
Highest annual count (year): 347 (1972)
Lowest annual count (year): 3 (1953)
Highest one-day count: 64 on 10 Nov. 1973
Seasonal mid-point of migration: 9 Nov
Early and late dates (year): 16 Aug. (1988) and 15 Dec. (1991)
Number of days it takes the middle 50% of the flight to pass: 33
Number of days it takes the middle 90% of the flight to pass: 52
Maximum rate of passage: 0.35 birds per hour in late November

Points of interest

The three most recent "invasion" periods for Northern Goshawks at Hawk Mountain Sanctuary occurred in 1972-1973, 1981-1983, and 1993 and 1995, when 347 and 307; 138, 136, and 128; and 105 and 106, individuals, respectively, were recorded migrating past the North Lookout. A single-day count of 64 goshawks in 1973, recorded during the first of these invasions, fell just five birds short of the Sanctuary's annual average for the species. In late November, the daily chance of seeing at least one Northern Goshawk at the North Lookout peaks at 52%.

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Northern Harriers
(*Circus cyaneus*)

Northern Harriers are part of the family *Accipitridae*, which includes 224 species of hawks, eagles, vultures, harriers, and kites.

There are 13 species of harriers, worldwide.

The **Northern Harrier** is the only harrier in North America.

Northern Harriers have an owl-like facial disk that allows them to hunt by sound as well as by sight.

All **Northern Harriers** have a white rump patch.

Adult male **Northern Harriers** are gray above, adult females and juveniles are brown above.

Northern Harriers fly with their wings in a slight dihedral to help stabilize their flight. **Northern Harriers** hunt almost exclusively on the wing for small mammals and birds.

Male **Northern Harriers** often mate with two or more females in a single season.

In winter, **Northern Harriers** roost communally on the ground, often together with Short-eared Owls (*Asio flammeus*).

Northern Harriers appear to be declining in North America because of the loss of natural open habitats.

Book List

Raptor Bites

Northern Harriers
(*Circus cyaneus*)

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Field Identification

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Dunne, P., Sibley, D., & Sutton, C. 1988. *Hawks in flight*. Boston: Houghton Mifflin.

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What are Northern Harriers and how and when do they migrate at the Sanctuary?

The Northern Harrier is a slender, medium sized, low flying, open-habitat raptor typically associated with wetland marshes and dry uplands, including pastures and croplands. Northern Harriers occur, either as migrants, breeders, or both, throughout much of North America and northern South America. The species also occurs in Europe, Asia, and Africa. The Northern Harrier is the only North American representative of a cosmopolitan group of 13 species of harriers in the genus *Circus.*

One of the Northern Harrier's most distinguishing field characteristics is its conspicuous white rump, which is found in adults and juveniles of both sexes. Another is its owlish face, the result of a facial ruff similar in structure and function to that found in most owls. The species also is characterized by its long, narrow tail, lanky wings, and a deliberate wing-beat.

Adult male Northern Harriers are generally gray above, and white with rufous or rusty markings below. The outermost portion of the wing, and to a lesser extent, its trailing edge, are black. Adult female harriers are brownish above, and dirty white with brown streaking below. Their wings are mainly dark brown, except for the outermost regions, which are black. Juveniles of both sexes are like adult females above, but darker, and rufous-tawny, sometimes with dark streaking, below. Adult females and juveniles of both sexes are difficult to separate in the field. Adult males and females, are easily separated in the field.

Although the species' general characteristics would seem to distinguish it from all other North American raptors, Northern Harriers are sometimes misidentified as Peregrine Falcons, Cooper's Hawks, and even Turkey Vultures.

Northern Harriers nest on the ground, typically in dense marshy vegetation, both alone and in loose colonies. Males advertise nesting territories and attract females by "sky dancing", a spectacular aerial display in which the male alternately plummets to within about 75 feet of the ground before ascending to more than 500 feet above its territory, during a series of U-shaped, undulatory flights. Although many male harriers are monogamous--at least within a single breeding season--other are bigamists or trigamists. One male harrier is reported to have maintained seven mates, simultaneously.

Outside of the breeding season, harriers frequently roost communally on the ground, sometimes together with Short-eared Owls. Individual roost sites can be as close as six to eight feet apart. Locations of communal roosts, at which dozens of individuals congregate, often are traditional, with some locations being used for decades.

Northern Harriers forage almost

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What are Northern Harriers and how and when do they migrate at the Sanctuary?

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exclusively on the wing, usually for small mammals and birds. The species also takes reptiles, amphibians, and even insects. Adult males are more likely to feed on birds than are adult females and juveniles. Unlike other hawks, harriers hunt by sound as well as by sight, explaining, in part, their low coursing flight. The species rarely hunts while perched.

Except when migrating, Northern Harriers are usually seen flying slow and low over open habitats, alternating flapping and gliding in a distinctively buoyant flight, with their wings held in a dihedral, or shallow "V," above their backs.

Northern Harriers have not been heavily persecuted by shooters, except, occasionally in the southeastern United States, where they are frequently accused of taking bobwhite quail. They rarely do so. In Great Britain, where the species is known as the Hen Harrier, and where it sometimes takes Red Grouse and other upland game, adult harriers are shot, and their eggs and nestling destroyed by gamekeepers.

The eggshells of Northern Harrier were thinner during the DDT era (1947-1969) than earlier this century, and organochlorine pesticide contamination has been linked to reproductive failure and population declines in the species. North American populations of harriers rebounded rather quickly following the regulation of DDT in the early 1970s.

The greatest current threat to Northern Harriers appears to be habitat loss, particularly the widespread destruction of wetland breeding and feeding sites, conversion of natural grasslands to mechanized agriculture, overgrazing, and the early mowing of pasture land nest sites. Because the species is a habitat and food generalist, widespread declines in harriers are likely indicative of widespread habitat dysfunction.

Although population trends vary regionally, the species appears to be declining globally. Annual rates of passage at the Sanctuary suggest a slight decrease in regional populations during the last 25 years.

Migration

Northern Harriers are partial–although often long-distance–migrants. Most individuals migrate alone. Harriers follow leading lines less often than do other raptors, and many are believed to migrate across a broad front through much of North America. In eastern and western North America, harriers comprise approximately 4% and 1-2% of raptor migrants counted at traditional migration watch sites, respectively.

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What are Northern Harriers and how and when do they migrate at the Sanctuary?

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Although Northern Harriers sometime soar while migrating, most migration appears to be achieved through alternating gliding and flapping flight. At many migration watch-sites, harrier migration peaks between 8 AM and 12 noon. Harriers tend to migrate at lower altitudes than most raptors, often within 30 feet of vegetation. The species is less affected by the passage of cold fronts than other raptors migrating past Hawk Mountain. Unlike many raptors, Northern Harriers migrate in light snow and rain.

During autumn migration, juveniles precede adults; juvenile females precede juvenile males; and adult female harriers precede adult males. In spring, adults precede juveniles, and males precede females.

Vital statistics at Hawk Mountain

Mean annual count: 223 Highest annual count year): 475 (1980)
Lowest annual count (year): 89 (1934)
Highest one-day count: 36 on 30 Sept. 1953 and 29 Oct. 1955
Seasonal mid-point of migration: 12 October
Early and late dates (year): 15 Aug. (1949, 1950, 1953, 1959 1988, 1990, 1994) and 14 Dec. (1985, 1987, 1993)
Number of days it takes the middle 50% of the flight to pass: 36
Number of days it takes the middle 90% of the flight to pass: 81
Maximum rate of passage: 0.49 birds per hour in late October

Point of interest

Harriers have the most protracted migration of any raptor at Hawk Mountain. In late October, the daily chances of seeing at least one harrier at the North Lookout peaks at 86%.

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Raptor Bites

Red-tailed Hawks
(*Buteo jamaicensis*)

Red-tailed Hawks are part of the family *Accipitridae*, which includes 224 species of hawks, eagles, vultures, harriers, and kites.

There are 16 sub-species of **Red-tailed Hawks** in North America.

Red-tailed Hawks often hunt along Interstate Highways, and are sometimes called roadside hawks.

Red-tailed Hawks are the largest buteos in eastern North America.

Red-tailed Hawks often feed on carrion.

Red-tailed Hawks sometimes specialize in stealing prey from other raptors.

Red-tailed Hawks perform elaborate aerial courtship displays.

Red-tailed Hawks are usually monogamous and sometimes mate for life.

Because of forest loss, **Red-tailed Hawks** have largely replaced Red-shouldered Hawks in many parts of eastern North America.

Dark morph **Red-tailed Hawks**, which occur mainly in western North America, have dark brown or black plumage except for a red tail.

Raptor Bites

Book List

Red-tailed Hawks
(*Buteo jamaicensis*)

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What are Red-tailed Hawks and how and when do they migrate at the Sanctuary?

The Red-tailed Hawk is the largest buteo in eastern North America. This widely distributed "roadside" hawk is one of the most commonly observed birds of prey in all of North America. Red-tailed Hawks are summer residents throughout most of central and southern Canada and the northern United States (including southern Alaska) and year-round residents south into central Mexico, the West Indies, and portions of Central America. With 16 recognized subspecies, this open-habitat generalist varies in plumage across its range.

Adult Red-tailed Hawks are best distinguished from other Buteos by dorsally reddish tail and dark patagial marks on the underwing. Adults are brownish above, with white mottling, and whitish to cream colored below. Many, but not all individuals, have partial belly bands comprised of dark brown streaks. Juveniles, which tend to have paler heads than adults, have narrower wings and longer, light-brown–not rufous–tails with narrow dark-brown bands. The belly bands of juveniles often are more conspicuous than those of adults. Males and females overlap considerably in size. Redtails tend to flap less, and to be more deliberate in their maneuvers while soaring than other buteos.

Red-tailed Hawks are opportunistic predators, scavengers, and piratical raptors that feed on most medium-sized mammals, birds, and reptiles. Most hunting is done from perches, although individuals also hunt while hovering, especially in regions with few trees. Many redtails supplement captured prey by scavenging on recently killed carcasses, including roadkills. In winter, the species frequently robs smaller raptors, including Rough-legged Hawks and Northern Harriers, of their prey. Some individuals appear to specialize in such piratical tactics.

Redtails, even sedentary birds who have maintained close contact with their mate from the previous breeding season, begin courting in late winter. Courtship, which typically involves circle soaring in tandem at great heights, sky-dancing (i.e., roller-coaster flight), leg dangling, and even talon grasping by the male, occurs over a period of several weeks to more than a month. Copulation lasts from 5 to 15 secs. Redtails–especially sedentary individuals–frequently are monogamous, and sometimes mate for life.

Red-tailed Hawks build relatively large stick nests that sometimes measure 30 inches across. Nests, which are built by both members of the pair, typically are placed in the crowns of tall trees in woodlots and tree-rows, and, less frequently, in large contiguous forests. Nest-sites usually afford a commanding view of the surrounding landscape. The nest, which takes about a week to build, often is refurbished with greenery. Although many pairs reuse nests from previous years, others build one or more alternative nests in a single season.

Females lay 2-4 eggs, which are

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What are Red-tailed Hawks and how and when do they migrate at the Sanctuary?

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incubated by both parents, and which take from 4 to 5 weeks to hatch. Young redtails, which fledge 42-46 days after hatching, remain close to the nest and are fed by their parents for an additional 2 to 4 weeks. Some juveniles remain somewhat attached to their parents for as long as 10 weeks after fledging. Although a few yearlings breed successfully, most individuals do not breed until they are almost two years old.

Unlike several other large raptors, the Red-tailed Hawk was never singled out as a pest species in Pennsylvania. Even so, the species' habit of perching conspicuously in open farmland habitat made it a frequent target of erstwhile game managers. As a result the redtail was considered a rare breeder in and around Hawk Mountain as recently as the late 1940s. Indeed, one prominent ornithologist claimed that their occurrence as common winter residents at the time was due, in part, to the species' "hard-earned ability to correctly judge the range of the ever-ready shotgun" (Poole 1947). Evidence suggests that this threat has declined in recent years.

Red-tailed Hawks did not undergo large-scale reproductive failures or population declines during the DDT era earlier this century. Current threats to the species include sporadic shooting and harassment at nest sites, and collisions with automobiles and trucks.

Red-tailed Hawks have largely replaced Red-shouldered Hawks throughout much of eastern North America as forest fragmentation has created patchwork habitats favorable to the former. Overall, the species appears to be increasing its breeding and wintering populations throughout Pennsylvania and much of eastern North America.

Migration

Red-tails tend to be resident at low latitudes and migratory at higher latitudes, especially in regions of prolonged snow cover. Even so, some individuals appear to remain in the northernmost reaches of the species' range in all but the harshest winters.

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What are Red-tailed Hawks and how and when do they migrate at the Sanctuary?

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Vital statistics at Hawk Mountain:

Mean annual count: 3,208
Highest annual count (year): 6,208 (1939)
Lowest annual count (year): 1,525 (1956)
Highest one-day count: 1,144 on 24 Oct. 1939
Seasonal mid-point of migration: 1 November
Early and late dates (year): 15 Aug. (1949, 1969, 1971, 1982, 1983, 1984, 1988, 1990, 1994) and 15 Dec. (1981, 1985, 1991, 1992)
Number of days it takes the middle 50% of the flight to pass: 18

Number of days it takes the middle 90% of the flight to pass: 44
Maximum rate of passage: 15 birds per hour in early November

Points of interest:

From late October through early November, the daily chance of seeing at least one Red-tailed Hawk at the North Lookout peaks at 96%.

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Fact Page

Rough-legged Hawks
(*Buteo lagopus*)

Rough-legged Hawks are part of the family *Accipitridae*, which includes 224 species of hawks, eagles, vultures, harriers, and kites.

Rough-legged Hawks have feathered legs that help conserve heat.

Rough-legged Hawks are circumpolar birds that breed in the arctic tundra of North America, Europe, and Asia.

Rough-legged Hawks are the most northern of all buteos, and one of the most common of all arctic raptors.

Rough-legged Hawks have several plumages, ranging from completely dark morphs to much lighter morphs.

Male **Rough-legged Hawks** often are darker than females.

Although they typically migrate in small groups or as single birds, **Rough-legged Hawks** sometimes migrate in large flocks.

Many **Rough-legged Hawks** have breeding territories as small as one square mile.

During the breeding season, **Rough-legged Hawks** feed almost exclusively on lemmings and voles.

Rough-legged Hawks often hover in stationary flight while searching the treeless tundra for prey.

While soaring, **Rough-legged Hawks** hold their wings in a slight dihedral.

Rough-legged Hawks often pirate prey from Northern Harriers.

Book List

Raptor Bites

Rough-legged Hawks
(*Buteo lagopus*)

Bent, A.C. 1937-1938. *Life histories of North American birds of prey*. (vol.1-2). New York: Dover.

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Fact Page

Red-shouldered Hawks
(*Buteo lineatus*)

Red-shouldered Hawks are part of the family *Accipitridae*, which includes 224 species of hawks, eagles, vultures, harriers, and kites.

Red-shouldered Hawks are daytime ecological equivalents of Barred Owls (*Strix varia*).

Because of forest fragmentation, Red-tailed Hawks (*Buteo jamaicensis*) have replaced **Red-shouldered Hawks** in many parts of eastern North America.

Red-shouldered Hawks sometimes compete with Broad-winged Hawks (*Buteo platypterus*) for nest sites.

Red-shouldered Hawks have long rudder-like tails that allow them to turn quickly while pursuing prey.

Red-shouldered Hawks are easily identified by a crescent "window" on their wings.

Red-shouldered Hawks often feed on aquatic and semi-aquatic animals, including small fishes and frogs.

Red-shouldered Hawks are quite vocal when courting. Their calls are often mimicked by Blue Jays (*Cyanocitta cristata*).

Red-shouldered Hawks are found in two separate regions of North America, California and the eastern United States.

Red-shouldered Hawks have paler feathers in Florida than in the northern United States.

Book List

Raptor Bites

Red-shouldered Hawks
(*Buteo lineatus*)

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What are Red-shouldered Hawks and how and when do they migrate at the Sanctuary?

The Red-shouldered Hawk is a slender, crow-sized, relatively long-winged, forest-dwelling Buteo that occurs throughout much of the eastern United States and south-eastern Canada, as well as in southernmost coastal Oregon, coastal California, and northern Baja, Mexico. Some members of eastern populations migrate as far as northeastern and central Mexico each winter. The Red-shouldered Hawk exhibits considerable anatomical and plumage variation within its range.

Red-shouldered Hawks are best distinguished by their red-shoulder patches, mottled white, but, generally, dark primaries, and crescent-shaped, seemingly translucent wing panels. The tail has several broad dark bands, that alternate with 3-5 narrow white stripes. As might be expected of a forest-dwelling bird, the tail is relatively long for a Buteo. Although Red-shouldered Hawks are intermediate in size between Broad-winged and Red-tailed hawks, their general appearance, especially in flight, is that of a decidedly lankier, less Buteo-like raptor, and indeed, there is considerable debate regarding the species' placement in the genus. Females are only marginally larger than males, and there is considerable size overlap between the sexes. The Florida subspecies is decidedly paler than other subspecies. Northern birds tend to be larger than southern birds.

Red-shouldered Hawks hunt both from perches and by direct search in flight. Individuals feed on a broad range of small mammals, snakes, frogs, and insects. Throughout much of northeastern North America, the species appears to be particularly dependent upon eastern chipmunks (*Tamias striatus*). Crayfishes are important dietary items in the Southeast. Because of its diet, and the fact that it inhabits moist lowland forests near open water, the Red-shouldered Hawk is frequently considered to be the daytime equivalent of the Barred Owl (*Strix varia*), in much the same way that the larger and more robust Red-tailed Hawk is considered the diurnal equivalent of the larger Great Horned Owl (*Bubo virginianus*).

Courting pairs frequently circle-soar together, with wings and tails spread, while calling. Such events are often followed by sky dances, in which the male performs a series of steep dives and rapid ascents before copulating with the perched female. The Red-shouldered Hawk is quite vocal both when courting and when establishing its territory, so much so that the species' territorial scream is frequently imitated by Blue Jays (*Cynocitta cristata*). Although Red-shouldered Hawks are generally monogamous, one Florida nest was attended by two males and one female.

Red-shouldered Hawks usually nest in deciduous trees in deciduous or mixed deciduous-coniferous forests. Nests, which

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are built by both members of the pair, are usually placed in the crotch of the main trunk of the tree. Most nests consist of sticks, strips of bark, and dried leaves. Nests, which are 17 to 24 inches across and ten inches deep, take from one to five weeks to complete. Nests are lined with mosses, lichens, and conifer sprigs at egg laying.

Females usually lay 2-4 eggs and do most of the incubation. Chicks hatch after approximately 33 days of incubation, and fledge about 35 days later. Although older chicks sometimes fight among themselves while being fed, sibling aggression is not especially pronounced. Fledglings, which are sometimes fed by their parents for up to 8-10 weeks after fledging, are capable of hunting on their own at between 10-13 weeks of age. Yearlings sometimes breed successfully, but most Red-shouldered Hawks do not breed until they are nearly two years old.

Although the species remains still common in many portions of its range–especially in California, where it is expanding into suburban habitats–numbers of Red-shouldered Hawks appear to be declining overall. In some areas the species is being replaced by Red-tailed Hawks, as lowland forest habitats are drained or cut. Counts at Hawk Mountain Sanctuary are relatively stable since the early 1960s.

Migration

Red-shouldered Hawks are partial migrants, with most individuals in the northern half of the species range migrating, and most in the southern half remaining on or near territory year-round. Juveniles tend to migrate earlier than adults. Numbers of migrants often are higher at coastal sites than farther inland. The species usually migrates alone, although flocks of three or more birds sometimes occur, especially during peaks in migration. Red-shouldered Hawks typically, avoid lengthy water crossings.

Migrants typically fly at from 1500 to 3000 feet, in soaring, gliding, and flapping flight. Hawk Mountain Sanctuary Curator Maurice Broun recorded Red-shouldered Hawks flying at approximately 28 miles/hour at the Sanctuary's North Lookout. Most of the Red-shouldered Hawks migrating past Hawk Mountain Sanctuary probably overwinter in the southeastern United States.

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Vital statistics at Hawk Mountain

Mean annual count: 245
Highest annual count (year): 468 (1958)
Lowest annual count (year): 87 (1971)
Highest one-day count: 148 on 19 Oct. 1958
Seasonal mid-point of migration: 24 October
Early and late dates (year): 18 Aug. (1984) and 14 Dec. (1987)
Number of days it takes the middle 50% of the flight to pass: 17
Number of days it takes the middle 90% of the flight to pass: 44
Maximum rate of passage: 0.98 birds per hour in late October

Points of interest

More than 100 Red-shouldered Hawks have been seen during single days of observation at the North Lookout on only three occasions, once each in 1956, 1958 and 1983. In late October, the daily chance of seeing at least one Red-shouldered Hawk at the North Lookout peaks at 83%.

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Broad-Winged Hawks
(*Buteo platypterus*)

Broad-winged Hawks are part of the family *Accipitridae*, which includes 224 species of hawks, eagles, vultures, harriers, and kites.

Broad-winged Hawks are named for their short, broad wings.

Broad-winged Hawks are the smallest buteos in Eastern North America.

Populations of **Broad-winged Hawks** appear to be expanding westward, especially in Canada.

Broad-winged Hawks are one of the most migratory buteos in North America.

Broad-winged Hawks are long distance migrants, many of which breed in Canada and winter in Brazil.

On migration, **Broad-winged Hawks** travel in flocks of hundreds and sometimes thousands, of birds.

Broad-winged Hawks conserve energy on migration by soaring on thermals and mountain updrafts.

Unlike some raptors, **Broad-winged Hawks** build new nests every year.

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(*Buteo platypterus*)

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What are Broad-winged Hawks and how and when do they migrate at the Sanctuary?

The Broad-winged Hawk is the smallest and most migratory Buteo in eastern North America. This stout, compact, and, exceptionally migratory, forest-dwelling raptor, occurs across most of the forested eastern United States and southern Canada east of British Columbia. Nonmigratory, island forms of Broad-winged Hawks occur on Cuba, Puerto Rico, and on several other islands in the West Indies. Although the Broad-winged Hawk is named for its broad wings, it is the bird's conspicuously banded tail that provides this raptor's most distinctive field mark.

Much like the Cooper's Hawk, adult Broad-winged Hawks are brownish above and barred rufous below. The blackish-brown tail of adults has one especially conspicuous broad white band and a second, narrower one. Juveniles, which are similar to adults above, and are whitish with brown streaking below, have light-brown tails with 4-5 dark-brown bands. In both adults and juveniles, the underwing is whitish, with a darkish band along the trailing edge. The rare, dark-morph Broad-winged Hawk is generally blackish throughout. Broadwings have a prominent yellow-green cere that often is visible in head-on flight. In addition to these features, the species can be distinguished from other buteos by its smaller size, compact configuration, and more simply-profiled, pointed wings.

Broad-winged Hawks are inconspicuous, still-hunting, generalist predators that feed largely on small mammals, birds, amphibians, reptiles, and invertebrates. Individuals rarely stoop on or pursue prey for great distances. Throughout the year, but especially on migration, as well as when overwintering in Central and South America, broadwings hunt along forest edges, often on open-habitat species of prey.

Broad-winged Hawks usually place their smallish (12-20 inches wide; up to 10 inches deep) and relatively crude stick nests in the crotch of the main trunk of deciduous and, sometimes, coniferous trees. Both male and female help build the nest, which is lined with fresh deciduous sprigs at the time of egg laying. Occasionally, nests are constructed in abandoned bird's nests or squirrel drays. A Michigan nest reported in Arthur Cleveland Bent's "Life Histories of North American birds of prey" consisted of "20 white oak twigs...; 26 chestnut twigs...; 50 chestnut oak twigs...; 77 dead sticks probably principally chestnut; 2 chestnut blossom, 46 chestnut bark scales...; and a few leaf sprays."

Female broadwings, which usually lay two or three eggs, do most, if not all, of the incubation and brooding. Chicks hatch after 28-31 days, and fledge 29-31 days later. Within a week or so of fledging, juveniles are intercepting their parents for food as the latter attempt to return to the nest to feed their young. Siblings, especially in larger broods, frequently fight among themselves

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What are Broad-winged Hawks and how and when do they migrate at the Sanctuary?

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for access to their parents at such times.

There is little evidence that broadwings were substantially affected by the widespread use of organochlorines earlier in this century. The current world population of this exclusively Western Hemisphere raptor appears to be in excess of 1,000,000 birds. At least some mainland, and many Caribbean populations appear to be threatened by the loss of large stands of contiguous forests. Counts at Hawk Mountain Sanctuary have been somewhat lower in recent years than they were earlier in the century, possibly because the species has changed its principal migration route regionally (see below). The species appears to be expanding its breeding range westward, especially in Canada.

Migration

The Broad-winged Hawk is one of only three complete migrants at the Sanctuary. Unlike most migratory birds of prey, broadwings typically migrate in flocks, often by the hundreds and even thousands; sometimes by the tens of thousands. Together with the Swainson's Hawk, Broad-winged Hawks offer some of the most impressive movements of birds in all of North America. More than 220,000 broadwings were recorded on a single day of observation along the northern shore of Lake Erie, south of Detroit, Michigan, in autumn of 1994. Approximately 1,000,000-1,500,000 broadwings are counted at a migration watch-site in coastal Veracruz, Mexico, each autumn.

Broad-winged Hawks, which rarely engage in flapping flight while migrating, represent the quintessential soaring raptor. Flocks, or rising "kettles," of soaring broadwings typically coalesce in thermals (pockets of rising hot air), which the birds use to gain altitude needed for directed gliding. It is the broadwing's dependence on late summer-early autumn thermals that probably necessitates the species early retreat from temperate-zone breeding grounds. At Hawk Mountain Sanctuary, for example, 99% of all broadwings have passed the North Lookout by the 28th of September, more than three weeks earlier than any of the Sanctuary's other 15 species of raptors.

Because broadwings frequently depend upon thermals to sustain their migratory journeys, the species is particularly active near mid-day, especially when the sun is shining. Most migration occurs within 2500 feet of the ground, although broadwings will soar at considerably higher altitudes, especially in the middle of the day. At Hawk Mountain Sanctuary, the season's best flights often occur 2 to 3 days after the passage of a cold front, during periods of fair weather. Broadwings avoid water crossings, as well as flights during, rain, fog, or periods of strong headwinds. Although broadwings do feed on migration, especially in northern portions of their range, where individuals are

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What are Broad-winged Hawks and how and when do they migrate at the Sanctuary?

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frequently seen chasing and capturing dragonflies while migrating, some researchers believe the species travels for long distances in the tropics without feeding.

Most of the Broad-winged Hawks migrating past Hawk Mountain Sanctuary overwinter in southern Central America, and northern and central South America.

Vital statistics at Hawk Mountain

Mean annual count: 8,527
Highest annual count (year): 29,519 (1978)
Lowest annual count (year): 2,886 (1946)
Highest one-day count: 11,349 on 16 Sept. 1948
Seasonal mid-point of migration: 15 September
Early and late dates (year): 15 Aug. (1948, 1949, 1950, 1953, 1959, 1963, 1964, 1968, 1969, 1971, 1982, 1983, 1984, 1988, 1990, 1993, 1994) and 17 Nov. (1984)
Number of days it takes the middle 50% of the flight to pass: 5
Number of days it takes the middle 90% of the flight to pass: 17
Maximum rate of passage: 47 birds per hour in late September

Points of interest

Almost half of all raptors migrating past the Sanctuary's North Lookout are Broad-winged Hawks. In most years, the highest daily count for this species exceeds 1,000 birds. Six "thousand bird" days were recorded in 1963 and 1978. In September, the daily chance of seeing at least one Broad-winged Hawk at the North Lookout peaks at 93%.

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Swainson's Hawks
(*Buteo swainsoni*)

Swainson's Hawks are part of the family *Accipitridae*, which includes 224 species of hawks, eagles, vultures, harriers, and kites.

Swainson's Hawks were named for the artist William Swainson who first drew the species in 1827. Swainson, unfortunately, misidentified the bird as a Common Buzzard (*Buteo buteo*).

Swainson's Hawks have several different plumages, including completely dark morphs and much lighter, almost white, morphs.

Swainson's Hawks are long-distance migrants that sometimes travel in large groups of tens of thousands.

Swainson's Hawks migrate up to 12,500 miles each year.

Swainson's Hawks overwinter in Argentina, where they feed almost exclusively on locusts (*Orthoptera*), and are called "Aguilucho langosteros," which is Spanish for locust hawks.

Breeding populations of **Swainson's Hawks** have decreased since the 1980s, in part because of a decline of Richardson's ground squirrels (*Spermophilus richardsonii*), their principal prey in the breeding season.

In the winter of 1995-96, an estimated 20,000 **Swainson's Hawks** were killed by pesticide poisoning in Argentina.

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Raptor Bites

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