How many feathers do hawks, eagles and falcons have?

Feathers, not flight, are the distinguishing characteristic of birds. If an animal has feathers, it is a bird. If an animal does not have feathers, it is not. Indeed, the tell-tale impressions of feathers—not the associated reptile-like bones—helped scientists identify the more than 150-million-year-old fossilized remains of *Archaeopteryx lithographica*, as those of an ancient bird.

In addition to providing a rigid airfoil for flight, feathers insulate a bird from summer heat and winter cold. Along with body oils, feathers help waterproof birds, and shield their skin from dust and debris. The various colors of feathers may serve to hide or advertise a bird’s presence.

In general, birds have lots of feathers, especially around heat-sensitive areas such as the head and neck, where upwards of 40% of a bird’s feathers can be found. Larger species tend to have more feathers than smaller species. For example, a 3- to 4-gram Ruby-throated Hummingbird (*Archilochus colubris*) has about 950 feathers, compared with 25,000 for a 15- to 18-lb Whistling Swan (*Cygnus columbianus*). Outside the tropics, birds tend to lose some of their feathers over the course of each breeding season, replacing them only in fall, just in time for winter. The number of feathers varies little among members of the same species.

Except for detailed studies of wing- and tail-feather molt in several raptors, the number of feathers that each species of raptor has not been well studied. Even so, we do know that Barred Owls (*Strix varia*) have about 9,200 feathers and that Bald Eagles (*Haliaeetus leucocephalus*) have about 7,100. Again proving its misnomer, 30% of a Bald Eagle’s feathers are on its head! With a combined weight of almost 700 grams, the plumage of a Bald Eagle comprises about one-sixth of the bird’s mass—almost three times as much as its skeleton!

Although almost all raptors are born with a relatively thin coating of down feathers, most develop a second thicker coat of down within days of hatching. Depending upon the species, true, fully-shafted feathers begin to appear within 10 days to 5-6 weeks, with smaller species "feathering out" more quickly than larger ones. By the time they are ready to fledge, young birds have acquired most of their first year’s plumage.

In most raptors, feathers cover all but small portions of the faces, feet, and toes of adult birds, but there are exceptions. Old and New World vultures, for
example, tend to have near-naked heads and necks, while only a few species such as the Lappet-faced Vulture (*Aegypius tracheliotus*) of Africa and the Middle East and the Red-headed or Pondicherry Vulture (*A. calvus*) of India, southern China, and Malaysia, have heads that are entirely devoid of feathers. For many vultures, feathers of the head and upper neck are limited to a small number of downy tufts, or so-called "cotton wool" feathers. Bald-headedness in vultures appears to be associated with their propensity for poking their heads into rotting carcasses of animals upon which they feed. Regularly banging one's head against decaying flesh would almost certainly soil and contaminate "unpreenable" head feathers, so sanitation is enhanced by the lack of head plumage.

*By comparison, most owls are fully feathered--head, feet, and toes--and in some instances so much so that only the bird's eyes, beaks, and talons remain uncovered. Such full-feathering helps muffle an owl's flight as its flaps and glides through the still night air in search of prey. Feathered feet and toes also protect the owl against potential bites from prey. Snowy Owls (*Nyctea scandiaca*) have particularly well feathered feet and toes--useful insulation against cold arctic weather. The Rough-legged Hawk (*Buteo lagopus*), a tundra-dwelling diurnal raptor, shares this adaptation. Old World fishing owls, which prey on fish in water, have unfeathered feet and toes.*

Like most birds, diurnal birds of prey have ten primary flight feathers on each wing, along with 14 to 25 secondaries (falcon typically have 16), and 12 or 14 tail feathers. Larger species tend to have greater numbers of secondaries. Northern Harriers (*Circus cyaneus*), for example, have 14; Cooper’s Hawks (*Accipiter cooperii*) 15; Red-tailed Hawks (*Buteo jamaicensis*) 17; Great Horned Owls (*Bubo virginianus*) 14; Black Vultures (*Coragyps atratus*) 19; Osprey (*Pandion haliaetus*) 20; King Vultures (*Sarcoramphus papa*) 21; California Condors (*Gymnogyps californianus*) 22; and Andean Condors (*Vultur gryphus*) 25. Bobwhite Quail (*Colinus virginianus*)--which spend most of their time walking--have only 10 secondaries, while the extremely long-winged and long-flighted Wandering Albatross (*Diomedea exulans*) has 32.

Feathers--which are an astonishingly complex extension of a bird's skin--consist mainly of keratin, the fibrous protein that makes up human hair and nails. Although avian anatomists have classified feathers into dozens of different types, the typical or classic type is the "contour feather," the kind that provides the outermost of most of the bird's body (including wing and tail feathers). Contour feathers consist of a hollow, cylindrical shaft (the quill), from which a long series of sidebranches (barbs) that form the "vane" of the feather. Barbs, in turn, have their own series of interlocking sidebranches called "barbules," which serve to align and hold the barbs in place along the vane. The structural complexity each
feather is considerable. The tail feathers of Northern Harrier, for example, are estimated to have at least 1.25 million barbules each. No wonder raptors spend so much time preening!

Many birds of prey have specialized down feathers called "powder down." Scattered across their body, these somewhat matted feathers grow continually, with parts breaking off into a fine powder that apparently helps absorb the grime and debris that raptors contact.

REFERENCES


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