

# A

## Accipiters



Molly Chamblee<sup>1</sup> and Kristine O. Evans<sup>2</sup>  
<sup>1</sup>School of Human Sciences, Mississippi State University, Mississippi State, MS, USA  
<sup>2</sup>Department of Wildlife, Fisheries and Aquaculture, Mississippi State University, Mississippi State, MS, USA

## Synonyms

[Accipitridae](#); [Goshawk](#); [Hawk](#); [Sparrowhawk](#); [True hawks](#)

## Definition

A genus of the Family Accipitridae considered to be “true” hawks including 48 different species, many of which are goshawks and “sparrowhawks.”

## Introduction

Accipiters, or “true” hawks, have a variety of characteristics that separate them from other genera within the Family Accipitridae. There are 48 different species within the genus and include Cooper’s hawks (*Accipiter cooperii*), Sharp-shinned hawks (*Accipiter striatus*), Northern goshawks (*Accipiter gentilis*), Eurasian

sparrowhawks (*Accipiter nisus*), and many others. Though empirical studies of Accipiter hawks are limited, previous research has shown fascinating morphological and behavioral characteristics that maximize survival and fitness in this group of species.

## Habitat and Populations of Accipiters

The three common Accipiters of North America include Northern Goshawks, Cooper’s hawks, and Sharp-shinned hawks. Northern Goshawks are listed by the US Department of Agriculture Forest Service as a “sensitive species” and a “management indicator” due to their acute sensitivity to changes in their environment (Lawler and Schumaker 2004). Accipiters typically inhabit mature, closed-canopy forested areas but can be found in riparian areas, open landscapes, or isolated clumps of trees as well. These hawks prefer stands of trees with higher canopy volume and structure, and/or tree height variations.

Though Accipiter habitats can be affected by wildfires, timber harvest, and diseases, they are most drastically affected by urbanization. While many Accipiters are found in unaltered or “natural” habitats, they also occupy suburban and urban areas throughout North America. Landscape change due to urbanization alters the composition of bird communities; however, it is uncertain the degree to which the urban footprint is harmful or beneficial to Accipiter hawk species.

## Color Morphs and Sexual Dimorphism

Many raptors come in different morphs, or colorations. Plumage polymorphism is defined as variation in feather plumage coloration within the same age or sex of a population. This polymorphism is rare across avian taxa, and only occurs in around 3.5% of bird species. Within Accipiter species plumage polymorphism is typically exhibited by a dark morph and a light morph; however, frequency of polymorphism in a population may represent a response to environmental circumstances or founder effect (i.e., reduced genetic diversity in a population due to a small number of ancestors) (Amar et al. 2013). Many Accipiter hawks also follow a unique form of sexual dimorphism: females are generally around 40% larger than males in most species. There are many hypotheses that have been proposed to explain the difference in size from hunting behaviors to female dominance in the species, but a definitive explanation has not yet been confirmed.

## Migration Behavior and Flight

Many Accipiters are considered migratory species. Cooper's hawks in California can be migratory or nonmigratory based on their geographic location, with populations in northern California exhibiting migratory behavior, and southern California populations exhibiting year-round residency (Bloom et al. 2017). This is assumed to be the effect of different climates and overwintering conditions across the migration range of these Accipiter populations.

Flight behavior in hawks is significantly affected by weather conditions during migration. Wind direction is the most significant driver in the flight height of migrating Accipiters. For example, Sharp-shinned hawks at Cape May, New Jersey, will fly lower in western winds, presumably to avoid being displaced over the Atlantic Ocean (Woltmann and Cimprich 2003). Alternatively, hawks have been shown to fly at higher altitudes in winds that are blowing in the direction of migration.

Accipiters also stagger migration initiation based on age and sex. First-year or younger birds precede adults by an average of 2 weeks, whereas females precede males by 1 week on average. However, there is evidence that some Accipiter species are shifting timing of migration compared to previous years, presumably due to increasing global temperatures. Autumn migration departures in sharp-shinned hawks are around 4 days later now than those in 1974 (Rosenfield et al. 2011). This could indicate climate change creating warmer, more-ideal environments for prey species.

## Pair Bonds

Many Accipiter species are thought to have ephemeral pair bonds – or bonds that are formed and only last through the breeding season. Female Accipiters usually have a larger home range than their male counterparts because males are the territory holders and more restricted in their movements than females. Females typically desert their breeding territories (which includes their mate), but males retain their breeding territory year-round. This separation among males and females results from limited resources in the breeding territory during the nonbreeding period. However, Accipiters of both sexes tend to remain year-round in urbanized areas, because of increased resource availability. For example, Cooper's Hawks in Tucson, Arizona maintained pair bonds outside of their breeding season creating perennial pair bonds (Boggie et al. 2015). This year-round interaction with a mate increases nest site defense, may prevent loss of a breeding site to competitors, and may solidify a mating-pair bond which could strengthen their partnership and improve breeding efficiency.

## Nesting

Accipiter nests can typically be found in large, tall trees in areas with limited groundcover. Nests built by raptors tend to be very large in comparison to the body size of the builder, with larger

nests at reduced risk of damage or loss during weather events. For example, goshawk nests may reach more than 600 kg compared to their body weights of only around 1 kg. Nest size is not only affected by the size of the Accipiter species that built it but also environmental factors and age. Many Accipiters refurbish their old nests, year after year; however, this does not necessarily contribute to increases in nest size over time due to compaction. Larger nests can also indicate a greater number of eggs laid in a clutch and may improve reproductive success of an individual. Temperature – and, in turn, climate change – can affect nest size (warmer weather equates to a decrease in nest size). Nest size also correlates with age of the individual and will begin to decrease as the bird begins to age. Thus, nest size is not only an indicator of clutch size but also builder condition (i.e., age) and potentially effects of climate change (Møller and Nielsen 2015).

Males will also build nests periodically. The purpose of these alternative nests is unclear, but it is inferred that these structures could be displayed for mate attraction and allow males to prepare a quality nest for a future reproductive year. A male Cooper's Hawk was observed in Oshkosh, Wisconsin, building a nest in the absence of a female mate; however, that nest was utilized later that year for a clutch of eggs (Rosenfield and Sobolik 2017).

### **Food Delivery and Brood Maturation**

In most Accipiter species, the female incubates her brood while the male hunts and delivers food to the nest. Once the nestlings become more independent, the female will usually resume hunting to help the male in provisioning food. While these delivery methods and contributions may differ slightly between individual species, males typically exhibit greater food delivery rates, up to 80% of deliveries on average (Eldegard et al. 2003).

Accipiter nestlings spend around 40 days in the nest. Eurasian Sparrowhawks specifically have a 4-week nesting period, followed by a fledgling period that lasts around 3–4 weeks. Fledglings

are dependent upon food delivery for a period of time after fledging and can depend on food provisioning from parents for weeks or months.

During the nesting period, the female rarely leaves the nest, except to retrieve food deliveries from the male. The female responds to male vocalizations during prey deliveries with a wail, and then she flies out to meet him and to retrieve the food. Direct nest deliveries by males are uncommon. It is believed that the female's wail may mimic that of the begging behavior in nestlings, which may encourage males to find and deliver more food.

A new behavior recently recorded by Rosenfield (2014) shows fledgling Cooper's hawks "proning." This activity notes that flighted fledglings will lie with their bodies flat against tree limbs or even on the ground. The purpose of this fledgling behavior is unknown, but some have hypothesized that it could be a variation of camouflage to help hide young birds as they continue to develop their flying skills and move further from their nest. This activity has been recorded across North America and is not specific to one individual group of Accipiters.

### **Predation Behavior**

Accipiter species all feed on different forms of prey, and prey preferences are driven by body size, location, and other factors. Eurasian sparrowhawks have been recorded to prey on over 120 bird species. Some Accipiters will even feed on other Accipiters; for example, goshawks have been known to prey upon the smaller sparrowhawks. While avian species provide the most biomass of most Accipiter diets, many – like Cooper's hawks – are opportunistic predators. They can feed on a variety of birds, mammals, and even lizards; but typically size of prey is relative to the raptor's body size.

Though often opportunistic in prey choices, Accipiters are known hunt strategically. Accipiters show limited association with prey "hotspots" (e.g., bird feeders, nesting areas that contain high volumes of predictable prey) and instead follow time and space unpredictability which gives prey

little warning on if/when they could be attacked (Roth and Lima 2007a). While unpredictability in their hunting movement seems random, hawks possess a well-developed sense of direction and location within their home ranges. Movements may be strategically unpredictable, whereby individuals distribute hunting activity evenly over the landscape to reduce likelihood of predator avoidance behavior in their prey.

Hawks also have specific temporal patterns in hunting based on their prey's activity patterns. Hunting during midday heat is energetically expensive and can deter the movements of prey species as well as the Accipiter species that hunt them. Roth and Lima (2007b), recorded a lack of early morning hunting by sharp-shinned hawks that could also indicate an avoidance of owls – a common predator of this Accipiter species. Cooper's hawks were also shown to avoid hunting activity in early morning hours.

## Conclusion

Accipiters, or “true” hawks, are unique in their behaviors and genera-specific characteristics. Their nests are found in a variety of ecosystems and their size and construction depends on multiple factors in their environment. Accipiters have a specific sexual dimorphism and unique color morphs. Pair bonds can either be ephemeral or perennial depending on their environmental circumstances, and mating rituals can even include a male building a nest to “impress” a female. Food delivery during brood maturation is performed by the male, young linger near their nests even after fledging, and a newly documented “proning” behavior has recently been documented in some species. These hawks also have very distinct temporal predation and migration patterns and behaviors. Overall, Accipiters are complex birds of prey with complex behaviors and qualities that separate them from other genera in the Family Accipitridae.

## Cross-References

- ▶ [Aves](#)
- ▶ [Biparental Care](#)
- ▶ [Breeding Season](#)
- ▶ [Brooding](#)
- ▶ [Camouflage](#)
- ▶ [Clutch](#)
- ▶ [Feeding](#)
- ▶ [Hatching](#)
- ▶ [Home Range](#)
- ▶ [Hunting](#)
- ▶ [Pair Bond](#)
- ▶ [Predator](#)
- ▶ [Prey](#)
- ▶ [Sex Differences](#)
- ▶ [Sexual Dimorphism](#)

## References

- Amar, A., Koeslag, A., & Curtis, O. (2013). Plumage polymorphism in a newly colonized black sparrowhawk population: Classification, temporal stability and inheritance patterns. *Journal of Zoology*, 289, 60–67.
- Bloom, P. H., McCrary, M. D., Papp, J. M., & Thomas, S. E. (2017). Banding reveals potential northward migration of Cooper's hawks from Southern California. *Journal of Raptor Research*, 51(4), 409–416.
- Boggie, M. A., Mannan, R. W., & Wissler, C. (2015). Perennial pair bonds in an Accipiter: A behavioral response to an urbanized landscape. *Journal of Raptor Research*, 49(4), 458–470.
- Eldegard, K., Selås, V., Sonerud, G. A., Steel, C., & Rafoss, T. (2003). The effect of parent sex on prey deliveries to fledgling Eurasian Sparrowhawks *Accipiter nisus*. *Ibis*, 145(4), 667–672.
- Lawler, J. J., & Schumaker, N. H. (2004). Evaluating habitat as a surrogate for population viability using a spatially explicit population model. *Environmental Monitoring and Assessment*, 94, 85–100.
- Møller, A. P., & Nielsen, J. T. (2015). Large increase in nest size linked to climate change: An indicator of life history, senescence and condition. *Oecologia*, 179, 913–921.
- Rosenfield, N. (2014). Proning behavior in Cooper's hawks (*Accipiter cooperii*). *Journal of Raptor Research*, 48(3), 294–297.
- Rosenfield, R. N., & Sobolik, L. E. (2017). Unusual timing of alternative nest building by an urban Cooper's hawk (*Accipiter cooperii*). *Journal of Raptor Research*, 51(4), 483–484.

- Rosenfield, R. N., Lamers, D., Evans, D. L., Evans, M., & Cava, J. A. (2011). Shift to later timing by autumnal migrating sharp-shinned hawks. *The Wilson Journal of Ornithology*, *123*(1), 154–158.
- Roth, T. C., & Lima, S. L. (2007a). Use of prey hotspots by an avian predator: Purposeful unpredictability. *The American Naturalist*, *169*(2), 264–273.
- Roth, T. C., & Lima, S. L. (2007b). The predatory behavior of wintering *Accipiter* hawks: Temporal patterns in activity of predators and prey. *Oecologia*, *152*, 169–178.
- Woltmann, S., & Cimprich, D. (2003). Effect of weather on autumn hawk movements at Fort Morgan, Alabama. *Southeastern Naturalist*, *2*(3), 317–326.