

## The identification of North American Accipiters

*Seventy man-years of watching and trapping distilled herewith:  
how to, and how not to, identify Accipiters*

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ON NUMEROUS OCCASIONS we have been asked to identify the three species in the genus *Accipiter* (most recently by the editor of *American Birds*, hence this article). Our usual answer to this question is: "... spend many hours in the field with an expert and carefully watch a few thousand correctly identified birds." We have found, unfortunately, that not all "experts" are really expert. The few experts we can personally certify are all trappers and banders of hawks. Banding stations for the capture of migrating hawks do not have room to entertain bird watchers and the researchers are too busy to be instructors. Serious students of hawk migration usually concentrate their efforts at one locality and rarely visit other stations; we thus rarely have the opportunity to evaluate the abilities of other workers. Trappers and banders have the advantage of verifying some of their identifications with the bird in the hand. In our combined, more than 70 man-years of watching and trapping hawks, we have banded more than 6000 *Accipiters* and observed many thousands more. During migration we trap more than 20 per cent of the *Accipiters* we observe. Our expertise was not acquired quickly and easily. The first Cooper's Hawk (*Accipiter cooperii*) we caught, about 30 years ago, became a Broad-winged Hawk (*Buteo platypterus*) after an embarrassingly long examination in the hand.

The characteristics we use to identify *Accipiters* are all related to size. The three *Accipiter* species differ little in body form or shape, and relative size of wing and tail. Thus the only easily noticeable difference between the three species (ignoring, for now, a few differ-

ences in plumage) is size. As a bird increases in size, wing area increases as a function of the square of a linear dimension, and volume and weight increase as a function of the cube of the linear dimension. If general body form and shape remain constant, doubling a bird's length results in a wing area four times as great and a body weight eight times as heavy. Wing loading (weight per unit wing area) is doubled. The heavier the wing loading the faster the bird can and must fly. This more rapid flight is not obvious to the human eye because a smaller object moving at the same speed as a larger one is perceived as moving more rapidly. The top flight speeds of hummingbirds and Starlings are about equal, yet the hummingbird appears to move much more rapidly (Hertel, quoted in Welty, 1975).

PARADOXICALLY, THE SMALLER, more slowly moving Sharp-shinned Hawk (*A. striatus*) beats its wings more rapidly than the rapidly moving Cooper's or Goshawk (*A. gentilis*). The reasons for this are complex. During the downstroke in flapping flight, the tip of the wing moves more rapidly through the air than the body. The larger the bird, the longer the wing and the greater this differential. A large bird can thus move its "propeller" rapidly with a relatively slow wing beat. At a given rate of flapping, a larger wing is subject to considerably greater mechanical stresses; an extremely large wing flapped very rapidly would disintegrate, unless it were constructed very sturdily, and thus very heavily, prohibiting flight. Rapid flapping of a very large wing would also require prohibitively large flight muscles.

A Sharp-shinned Hawk in flight is buoyant, owing to its light wing loading and flaps rapidly owing to its short wings. At the other extreme, Goshawk flight is more direct and "purposeful" because of the heavy wing loading. The Goshawk flaps slowly for it has long wings. Cooper's Hawks possess intermediate flight characteristics. These differences in flight characteristics are applicable for all birds of similar configurations but different sizes. For example, the Ring-billed Gull can be readily distinguished from the larger Herring Gull on the basis of flight characteristics, with a little practice.



*Sharp-shinned Hawk. Fire Island, N. Y. Photo/Harry N. Darrow.*



Adult Cooper's Hawk, Oct., 1974. Photo/Fred Tilly.

WE THINK THAT MANY birdwatchers would be able to identify the three species of *Accipiter* by watching a few hundred correctly identified Sharp-shinned, Cooper's and Goshawks and by paying close attention to size and flight behavior. Unfortunately there are complications. Female *Accipiters* are considerably larger than males; indeed, the differences between sexes within a species are almost as great as the differences between species. If one can identify *Accipiters* by size, one can also determine sex.

Figure 1 shows the estimated body length of males and females of the three *Accipiter* species in diagrammatic form. For each sex of each species, the long vertical line indicates the mean (average) length. The broad box to either side of the mean indicates one standard deviation, which (statistically) includes 68.3% of all the birds of that species and sex. The narrow box to either side indicates

two standard deviations which includes 95.4% of the birds, and the line extending to either side indicates three standard deviations, which includes 99.7%, or virtually all birds. The purpose of this method of presentation of data is to show the variation between sexes of a species as well as the difference between species. For example, all Cooper's are larger than all Sharp-shinned and most ♂ Cooper's are considerably larger than most ♀ Sharp-shinned. Further, all ♀ Sharp-shinned are larger than all ♂ Sharp-shinned. All three species are clearly separable by size. Although the sexes overlap in estimated length in the Cooper's and Goshawk, note that fewer than 5% of the birds fall into the zone of overlap. We might remind the reader that Fig. 1 illustrates "estimated" length. The length of a bird is difficult to measure in a live or dead specimen, and we have not attempted to measure body length on birds we have captured for

banding. We routinely measure weight, tail length, and wing chord. The latter measurement is the distance from the bend of the folded wing to the tip of the primaries. To arrive at "estimated body length" we have taken the average length for a species given in Peterson (1947) and then used the ratio of this measurement to our thousands of measurements of wing chord to arrive at the statistics presented in Fig. 1. The body length presented in Peterson is that of a museum specimen, which is roughly the distance from bill tip to tail tip of a bird lying on its back. We have used this, rather than other published measurements, because it most closely approximates the length of a bird in flight, which is how most *Accipiters* are observed.

We have also indicated the lengths of some common "roadside" birds in Fig. 1. From this we can see that a ♂ Sharp-shinned Hawk is slightly longer than an American Robin (*Turdus migratorius*) but shorter than a Mourning Dove (*Zenaidura macroura*). A ♀ Sharp-shinned Hawk is about as long as a Belted Kingfisher (*Megaceryle alcyon*) and shorter than a Common Flicker (*Colaptes auratus*). (Remember that kingfishers and flickers have longer beaks than hawks, and this is included in the measurement.) Cooper's Hawks average shorter than Common Crows (*Corvus brachyrhynchos*), males considerably so. Goshawks are considerably longer than crows.

THERE IS NO SINGLE reliable good measurement of size in birds; we feel that weight is one of the better ones. Figure 2 presents the weights of the three species of *Accipiters*. This figure is drawn from data gathered at Cedar Grove Ornithological Station, Wisconsin. Average weights of non-raptorial

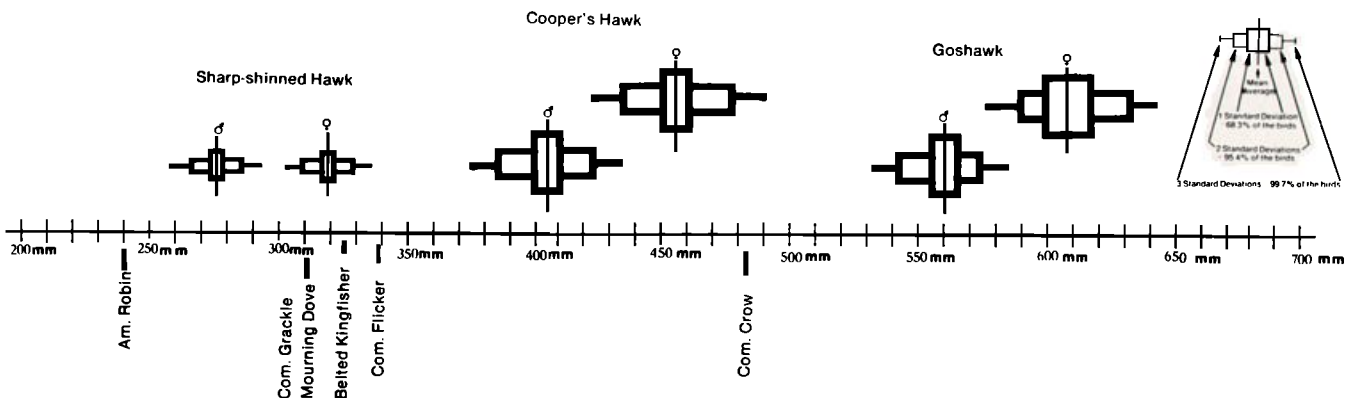


Fig. 1. Estimated body lengths of *Accipiters* and a few selected common species of birds. For the *Accipiters* the vertical line indicates the mean (average) length; the tall rectangle includes one standard deviation from the mean; the short rectangle, two standard deviations; the horizontal line, three standard deviations.

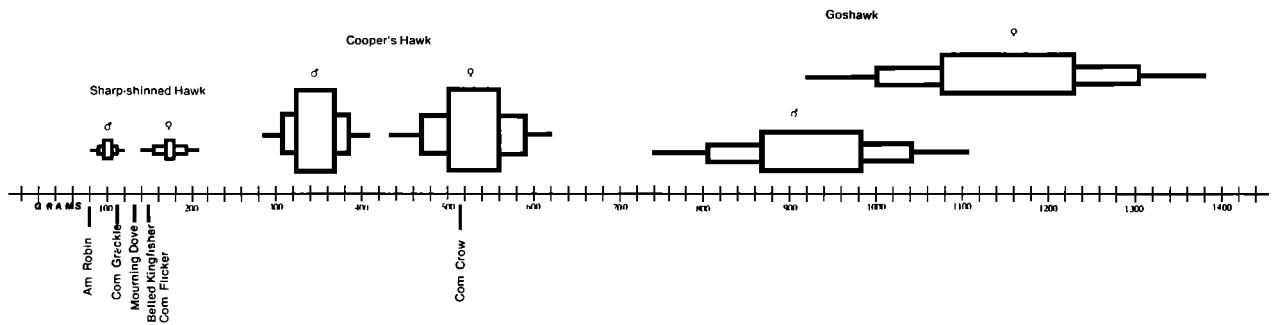


Fig. 2. Weights of *Accipiters* and selected species. Conventions as in Fig. 1.

species are also taken from data collected at Cedar Grove, except for those of the crow, which are taken from Roberts (1955). The average Common Grackle (*Quiscalus quiscula*) weighs about the same as a ♂ Sharp-shinned Hawk. Female Sharp-shinneds average slightly heavier than kingfishers or flickers. Female Cooper's Hawks weigh about as much as crows but ♂ Cooper's are considerably lighter. Most Goshawks are at least twice as heavy as a crow.

The standard method of identifying birds is by using plumage characteristics; in identifying hawks these are rarely definitive, and often misleading. We have tried to review everything that has been written on the identification of North American *Accipiters*. In the discussion that follows, we attempt to rectify those published accounts that are erroneous or misleading.

**S**EVERAL AUTHORS HAVE INDICATED that Sharp-shinned Hawks have notched or square tails. A few caution

the reader that this is true only when the tail is folded. We have found tail-shape to be unreliable for identification. Five representative drawings of Cooper's and Sharp-shinned tails are shown in Figure 3. We ask the reader to identify each drawing before reading further; correct identifications will be presented below. The drawings are tracings made from photographs of birds captured and held in hand. The four photographs were selected from 29 taken at our Cedar Grove banding station in autumn 1978. These 29 photographs were taken of 26 birds: one each ♂ and ♀ Sharp-shinned Hawks, and one Cooper's Hawk were photographed twice: each with a folded and then a slightly spread tail. We asked seven graduate students and professors, all ornithologists, to identify the photographs. All were permitted access to field guides. The average score was 75% correct. One of seven ♂ Sharp-shinneds was identified as a Cooper's by one person. Nine of 11 ♀ Sharp-shinneds were called Cooper's by one or more

respondents; one of the hawks was misidentified by five of the seven respondents. Five of the six Cooper's photographs were identified as Sharp-shinneds by one or more persons; one Cooper's photograph was misidentified by everyone. The one Goshawk photograph was called a Cooper's Hawk by six persons and a Sharp-shinned by one. The respondents were told that there might be a Goshawk among the photographs; this resulted in two Cooper's and one Sharp-shinned being identified as Goshawks. If the above has not convinced you that the tail-shape of *Accipiters* is not a reliable character, compare your identifications of Fig. 3 with the following: A, ♂ Sharp-shinned; B, ♂ Cooper's; C and D, ♀ Sharp-shinned; E, ♂ Cooper's. Figure 3 B is of a Cooper's tail with the tail feathers held somewhat abnormally; but the appearance of a square tail would persist if the outer feathers were covered by the adjacent ones, which does happen normally. The squared appearance is enhanced because

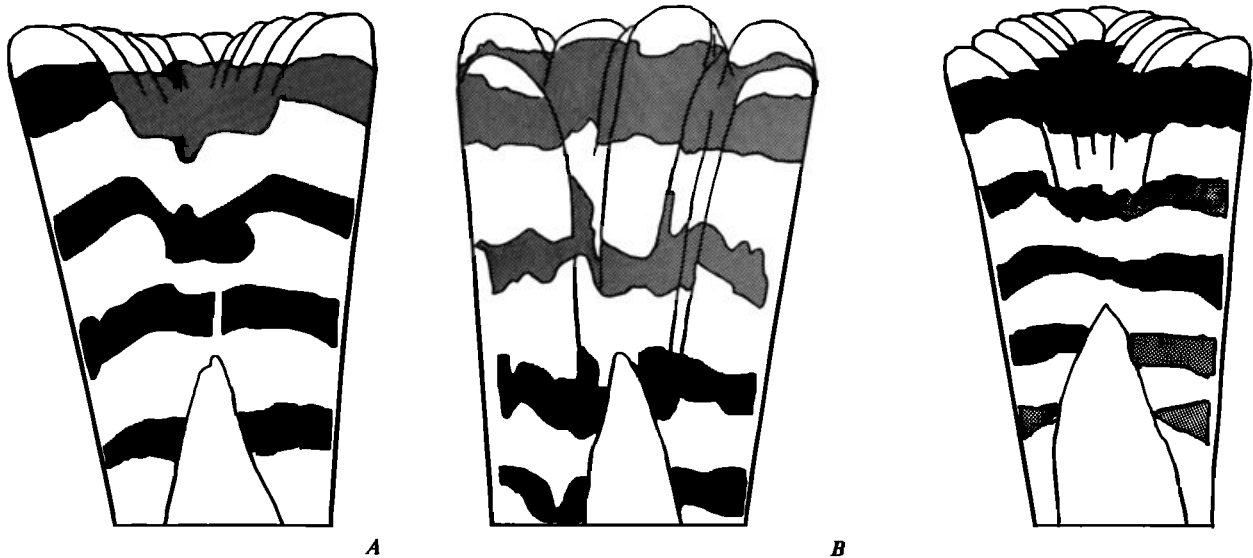


Fig. 3 (A-E). Tracings of photographs of five live, hand held Sharp-shinned and Cooper's hawks. The drawings have intentionally been drawn the same size. Identify each and compare your determinations with the correct ones given in the text.

the bird is in molt and several tail feathers are not of full length, but tail molt is prolonged in adults and is often found on birds during fall migration. If the outer tail feathers are not of full length, this will create the impression of a rounded tail; if central tail feathers are not of full length, this will create the impression of a notched tail.

**C**OOPER'S HAWKS DEFINITELY HAVE more rounded tails than do Sharp-shinned Hawks (or Goshawks) but the difference often appears slight and is difficult to discern. Female Sharp-shinned have tails that appear moderately rounded even when folded and both males and females appear to have rounded tails when the tail is spread in a fan, as in soaring. Three of five persons we tested identified a ♀ Sharp-shinned correctly when the tail was folded but called it a Cooper's when the tail was slightly fanned. Two of the seven persons tested noted that the code numbers on the two photographs were identical and decided that they were of the same bird. Tail-shape, at best, is an aid to identification but is definitely not a field mark.

Scheider (1975) and Haas (1975) have noted that Goshawks have relatively shorter tails than the other two *Accipiter* species. Analysis of our measurements suggests that immature ♂ Goshawks have tails that are 8% shorter (relative to body size) than immature ♀ Cooper's Hawks. The difference in adults is even greater: 13%. This difference, however, must be used with care because adult *Accipiters* have 2%-4% shorter tails than immatures.

It has been suggested that Goshawks have relatively longer wings than the other two species. Our data suggest that, relative to body size, the wing of an immature ♂ Goshawk averages 2% longer than an immature ♀ Cooper's. There is no difference between adults of the two species. Immature *Accipiters* of all three species have wing lengths that average about 1.5% shorter than those of adults; so relative wing length appears to be useless in identifying Goshawks. However, if wing length is judged relative to tail length rather than to body size, Goshawks may appear longer winged because of their relatively short tails.

Brett and Nagy (1973) and Haas (1975) have suggested that Cooper's Hawk appear to have larger heads than Sharp-shinned or that the head of a Cooper's projects farther in front of a line drawn across the leading edge of the wings. Examination of a number of museum specimens and living birds in the hand failed to show relatively larger heads in Cooper's than in Sharp-shinned. We think that it is possible that Cooper's may, on the average, appear to stretch their necks a bit more than Sharp-shinned, but the way an individual bird holds its head and wings varies considerably from moment to moment. Further, we think the apparent prominence of the head in Cooper's, as compared to Sharp-shinned, is quite possibly a function of the relatively shorter wing length in the former as compared to the latter. Relative to body size, the wings of Cooper's appear to be about 7%-8% shorter than in Sharp-shinned. We think that this long wing of the Sharp-

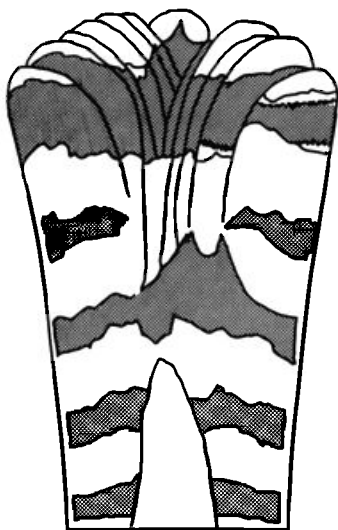
shinned, when moved forward in flight may create the impression of a leading edge which extends farther forward relative to the head and body than in the shorter-winged Cooper's Hawk. Relative to body size, the tail of Cooper's is 2%-3% shorter than in Sharp-shinned, but this difference is insignificant when compared to the difference in wing length.

**T**HUS, IN PROPORTION TO BODY size, Sharp-shinned have longer wings than the other two species and Goshawks have shorter tails than the other two species. This leaves the Cooper's with relatively short wings and a long tail.

Let us now turn our attention to differences in plumage color and pattern. The gray-barred breast of the adult Goshawk clearly distinguishes it from the other two species, but beware of the occasional pale-breasted ♀ Cooper's in poor light! Many adult Goshawks have dark shaft streaks on the breast feathers; on some individuals these are sufficiently prominent so that the pattern of barring on the breast is considerably obscured. Goshawks have a light-colored stripe over the eye in all plumages, but in more than a few immatures, particularly males, this can be very inconspicuous, even with the bird in hand. Several hawk watchers have indicated that adult Cooper's have darker caps than adult Sharp-shinned. Examination of a number of museum specimens reveals that the dark cap is a sex rather than a species related character. Adult ♂ Sharp-shinned have caps fully as dark as adult ♂ Cooper's. This character is thus useful only if one has a sufficient idea of size to place the bird in the ♀ Sharp-shinned/♂ Cooper's range, and get a rather good look at the cap.

**T**HE BARRING ON THE BREAST feather of an adult Cooper's tends to be of uniform width while in most Sharp-shinned it is somewhat wider at the shaft. As a result the barring on a Cooper's breast appears, on the average, to be somewhat finer and more regular than on that of a Sharp-shinned Hawk. At best, these characteristics are merely other aids to identification and require an excellent look at the bird.

Peterson (1947) has indicated that immature Cooper's Hawks are usually more sharply and finely streaked below than immature Sharp-shinned Hawks. Examination of many museum specimens indicates that this would result in



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*Immature Goshawk. Photo/Harry N. Darrow.*

correct identification of about 80%-90% of the birds, if one had excellent judgment on the width and distinctness of streaks and got a sufficiently good look at the bird. At the extremes, Cooper's have narrow streaks of nearly uniform width and Sharp-shinneds have streaks which are distinctly tear-drop shaped. Immature Sharp-shinneds also tend to be somewhat buffier on the breast than Cooper's, and the streakings tend to end somewhat higher on the belly in the Cooper's than in Sharp-shinneds, but both of these characters are highly variable and require an excellent look at the bird, and are therefore useless.

Several authors have indicated that one should look for the "white, fluffy undertail coverts" on the Goshawk. If this is intended as a character to identify *immature* Goshawks, we are mystified. The extent, and "fluffiness" of undertail coverts is an apparent function of size, but if "white" is supposed to indicate "immaculate" this statement is simply false. The undertail coverts in immature Sharp-shinneds and ♂ Cooper's are almost always immaculate. In immature ♀ Cooper's they are occasionally lightly

streaked. In immature Goshawks they are *always* streaked or spotted.

The dark bars on the tail feather of an immature Goshawk are in the form of a V, while the dark bars on the tail feather of an immature Cooper's Hawk run approximately straight across. This results in a zig-zag pattern of barring across the Goshawk tail, contrasted with a nearly even band in the tail of the Cooper's. This difference is easily distinguished if one gets an excellent look at the barring in a spread tail. The bands appear irregular in the folded tails of all three species.

To summarize the reliable plumage characteristics for identifying *Accipiters*, we have only the gray-barred breast of adult Goshawks, and the zig-zag barring of the tail of Goshawks. All other "field marks" are qualitative characters which show overlap between species and provide, at best, only a possibility of correct identification.

We end up then approximately where we began; the best way to identify *Accipiters* is by size and size-related characteristics; a skill that can be acquired only with considerable experience.

Although *Accipiters* are among the most difficult of the hawks to identify, many other species are also a problem. The system of field marks and identification by elimination simply does not work with hawks, falcons, and eagles. We recall seeing the following species identified as Sharp-shinned Hawks by otherwise highly reliable bird watchers: Cooper's, Goshawk, American Kestrel (*Falco sparverius*), Merlin (*F. columbarius*), Broad-winged. As Cooper's Sharp-shinned (very often!), Goshawk Broad-winged, Red-shouldered (*Buteo lineatus*), Red-tailed (*B. jamaicensis*) Peregrine (*F. peregrinus*). As Goshawks Sharp-shinned, Cooper's, Red-tailed, Northern Harrier (*Circus cyaneus*). We suspect that if we had kept a list of misidentifications we have witnessed over the years, it would include most of the possible combinations of species of hawks and falcons. We urge extreme care in the identification of *Accipiters* and other diurnal raptors. One should not be too proud to list a bird as an "unidentified *Accipiter*" or even "unidentified hawk or falcon."

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## Ninth Salon of Photography

Once again *American Birds* will publish (if budgetary considerations permit) a competitive salon of bird photographs by its readers. Modest first, second, and third prizes as well as honorable mentions will be awarded in two categories: color and black-and-white. Color submissions may be in the form of transparencies or prints. Deadline for acceptance will be September 1. First prize for color will be honored by being published as the front cover of the issue in which

the salon is published, if it is possible to frame the photograph in the dimensions of the *American Birds* cover. Each contestant will be limited to six entries in each category; entries will be judged on the basis of technical excellence, artistic merit, and difficulty. Please identify each print or transparency with name and address, and furnish a stamped envelope. Winners only will be asked later to supply biographical briefs and exposure data on winning photographs.