

# IDENTIFICATION OF BALD AND GOLDEN EAGLE FEATHERS

## Identification Guides for Wildlife Law Enforcement No. 15

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Wildlife law enforcement officers often encounter suspected eagle feathers, either loose or in crafted items such as headdresses and dance fans. Identification of these feathers can be challenging. Bald and Golden Eagle feathers are similar in size and their appearance changes dramatically with age in both species, with the feathers of subadult eagles particularly variable. In addition, feathers of other large birds, including turkeys, geese, and vultures, may be used in place of eagle feathers and must be ruled out during the identification process.

This Identification Guide uses wing and tail feather scans from the Feather Atlas of North American Birds (<http://www.fws.gov/lab/featheratlas>) to illustrate distinctive characters of adult and subadult Bald and Golden Eagle flight feathers. The features distinguishing eagle feathers from those of waterfowl, large gamebirds, vultures, and other raptors are also illustrated and discussed. Major points are summarized in Table 1 (p. 26).

**Terminology.** Flight feathers are the large wing and tail feathers that provide lift and maneuverability in flight. They are the feathers most commonly used in crafted items, and are thus the subject of this Identification Guide. On the wing, the outer ten flight feathers are the primaries; the inner flight feathers are the secondaries (Fig. 1).

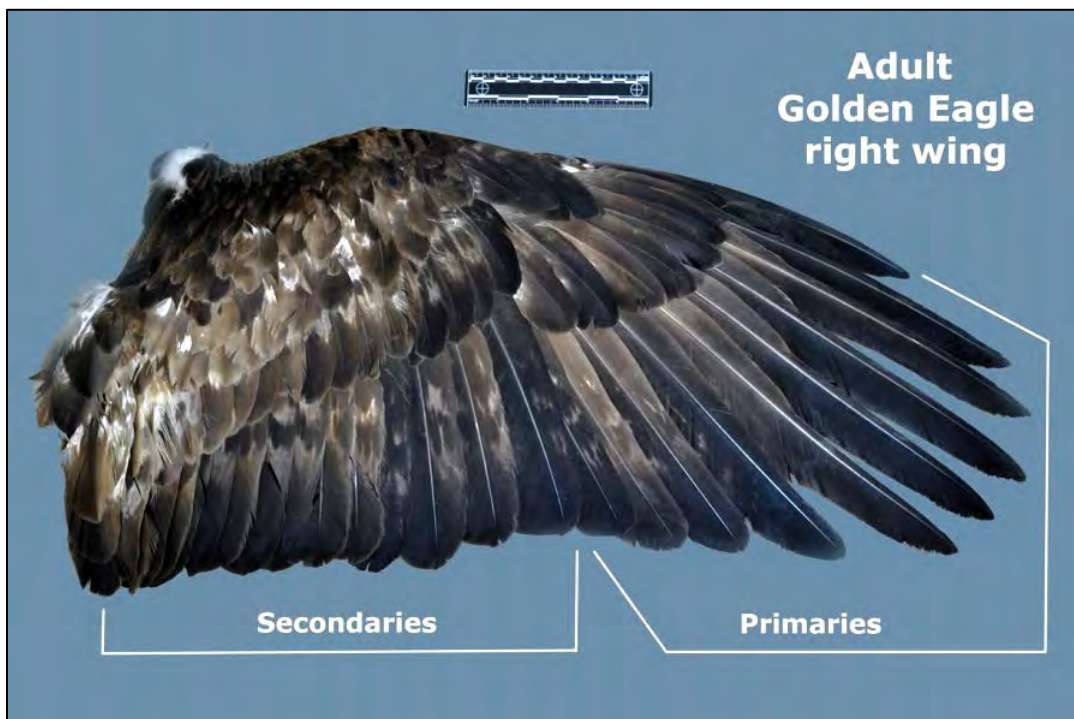
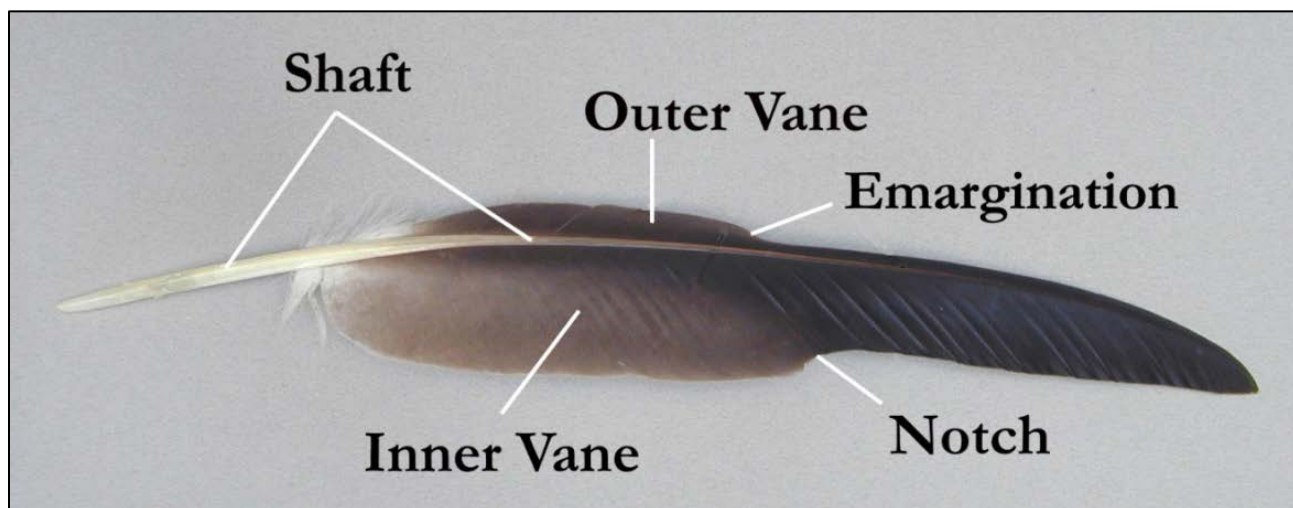


Figure 1. Right wing of adult Golden Eagle, showing the positions of the primaries and secondaries.

Figure 2 shows one of the outer primaries of a Bald Eagle, to illustrate the basic parts of a feather. The primaries of eagles are pointed, and the outer ones have narrow tips created by emargination of the outer vane and a notch in the inner vane. Eagle primaries are asymmetrical, with the inner vanes much wider than the outer. The inner wing feathers (secondaries) are rounded and the vanes are more symmetrical. The tail feathers are also rounded. The vanes on the outer tail feathers are very unequal, but they become progressively more symmetrical toward the center of the tail. It is often difficult to distinguish inner tail feathers from secondaries.



**Figure 2. Parts of an eagle feather (a Bald Eagle right outer primary).** For additional definitions and illustrations, see the **Glossary of the Feather Atlas of North American Birds** (<http://www.fws.gov/lab/featheratlas/glossary.php>)

The goal of this guide is eagle species identification, not age determination, and feathers from eagles of different ages are illustrated simply to show the range of variability for each species. In the following scans, adult refers to feathers exhibiting the final, fully mature pattern; subadult refers to feathers exhibiting any characteristics of birds that are not fully mature, including one-year-olds (“juveniles”). Both eagle species typically attain full adult plumage by their fifth year.

Note on Scans: In this Identification Guide, as on the Feather Atlas, all wing feathers are from right wings, and unless otherwise noted, the upper surfaces of the feathers are shown. The outermost wing feather is always positioned on the left side of the scan, with increasingly inner feathers arranged to the right. Eagle wing feather scans illustrate either all 10 primaries or a representative selection of eight secondaries (eagles possess approximately 14 secondaries). Some other species’ wing feather scans include both primaries and secondaries.

Tail feathers are also arranged with the outermost feather on the left, and the central tail feather on the right side of the scan. Eagles have twelve tail feathers; only the right half of each set of tail feathers is shown.

In all scans, the scale is in centimeters (2.54 cm = 1 inch; thus, 25 cm ≈ 10 inches).

## **DISTINGUISHING BALD AND GOLDEN EAGLE FLIGHT FEATHERS**

### Bald Eagle Adult

Adult Bald Eagles are easily recognizable, with their pure white heads and tails and dark brown bodies. The detached white tail feathers (Fig. 7) cannot be confused with Golden Eagle feathers (which are never all white), but may be confused with the white flight feathers of swans and domestic white forms of turkey (see section on distinguishing eagle feathers from other species, pp. 12-25). Adult Bald Eagle wing feathers are plain dark gray or gray-brown, sometimes with a very small whitish patch at the base (Fig. 3 and 4). They never exhibit marbling or other patterning within the vanes.

### Golden Eagle Adult

Adult Golden Eagles are brown overall, with no large areas of white. Most flight feathers of both wing and tail exhibit a diagnostic pattern called “marbling,” characterized by curved or irregular pale patches, spots, and bars (Fig. 3, 4, 7, and 8). These marbling markings contrast with the predominant chocolate-brown color of adult Golden Eagle feathers, and vary from light brown to tan to (rarely) almost white. Marbling is never seen on Bald Eagle feathers.

It is important to note that the outer three to five primaries of Golden Eagles lack marbling, and are plain grayish-brown, with almost black tips (Fig. 3). These are the feathers with a prominent “notch” in the vane and elongated finger-like tips. Such feathers are not common in crafted items, but when they are encountered, they usually can’t be distinguished from the corresponding feathers of Bald Eagle without reference specimens.

### Bald Eagle Subadult

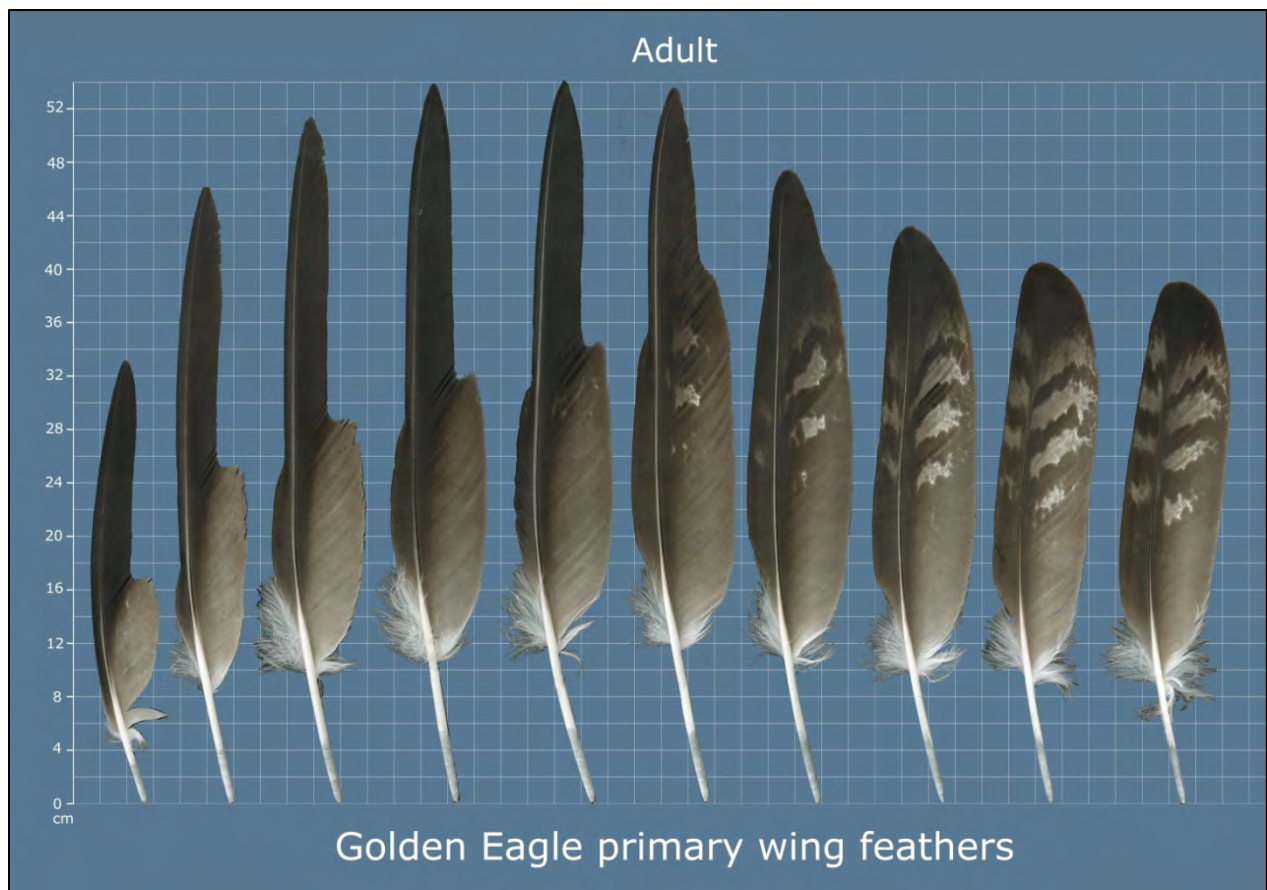
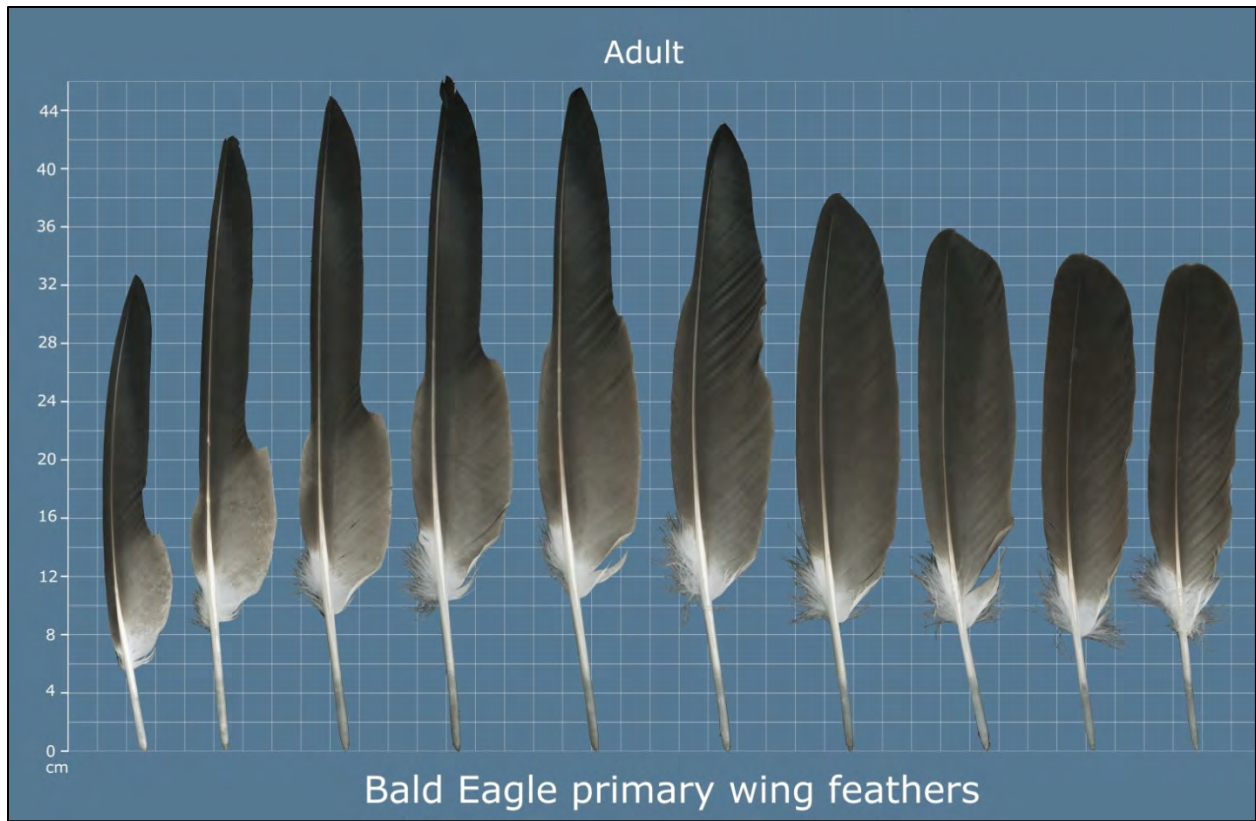
Bald Eagles undergo a more complex and variable series of immature plumages than do Golden Eagles. Juveniles (one-year-olds) are usually dark overall, while two- and three-year-olds may be very light, with large pale areas on the lower breast and belly.

This variability is seen in individual flight feathers, making subadult Bald Eagle feathers probably the most challenging to identify. In comparison with subadult Golden Eagle feathers, subadult Bald feathers look mottled or “mud-spattered” (Fig. 5, 6, 9, and 10). White areas are marked with blotches and speckles, and are often toward the middle or even tip of the feather, in isolated patches within the dark vane. If a pure white patch is present at the base of the feather, it is much smaller than the comparable area on a subadult Golden Eagle feather. Subadult Bald flight feathers occasionally show irregular pale markings toward the tip, but never the well-developed marbling patterns typical of Golden Eagle. If in doubt about a possible marbling pattern, look for white areas with speckling or blotching in other parts of the feather, which would rule out Golden Eagle.

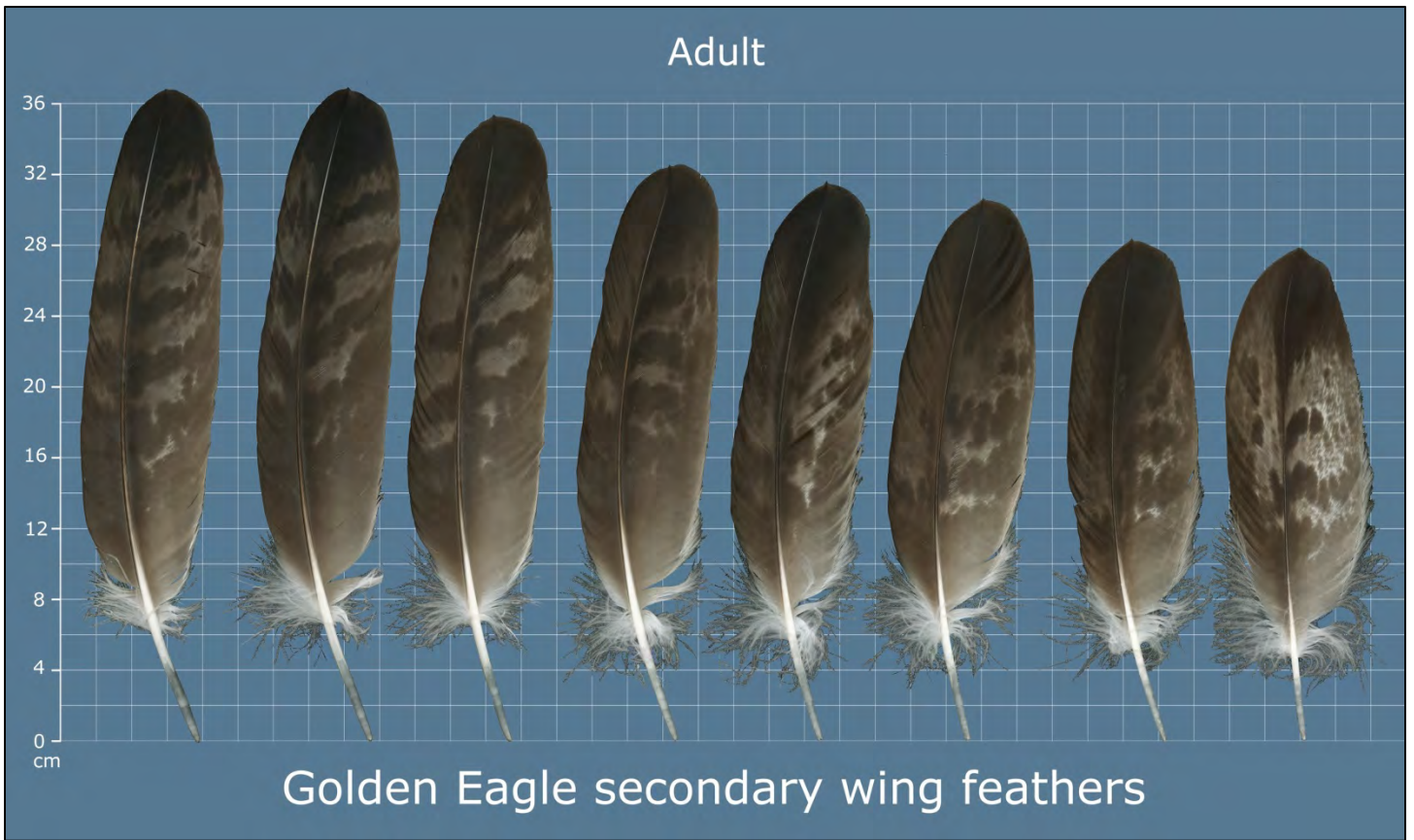
### Golden Eagle Subadult

Subadult Golden Eagles are distinguished from adults by the large amounts of white at the bases of their feathers (Fig. 5, 6, 9 and 10). In the flying bird, this is visible as white patches in the wing and at the base of the tail. The tail feathers of yearling (juvenile) Golden Eagles, with their striking white bases and dark tips, are the most prized eagle feathers for headdresses and other items.

The amount of white at the base of subadult Golden Eagle flight feathers varies with age (most in one-year-old birds), the location of the feather (most on inner secondaries and tail feathers, least in outer primaries), and also shows individual variation. Nevertheless, there are several consistent differences from subadult Bald Eagle feathers. The white area is almost always a solid patch extending up from the base of the vane, not a white patch surrounded by a darker area as in subadult Bald Eagles. A large part of the white area is typically pure white (Fig. 9), even if there are brown speckles at the edges (Fig. 6). Finally, subadult Golden Eagles often show the beginnings of the distinctive “marbling” pattern of adults, either at the edge of the white patch or within the brown outer portion of the feather (Fig. 10).



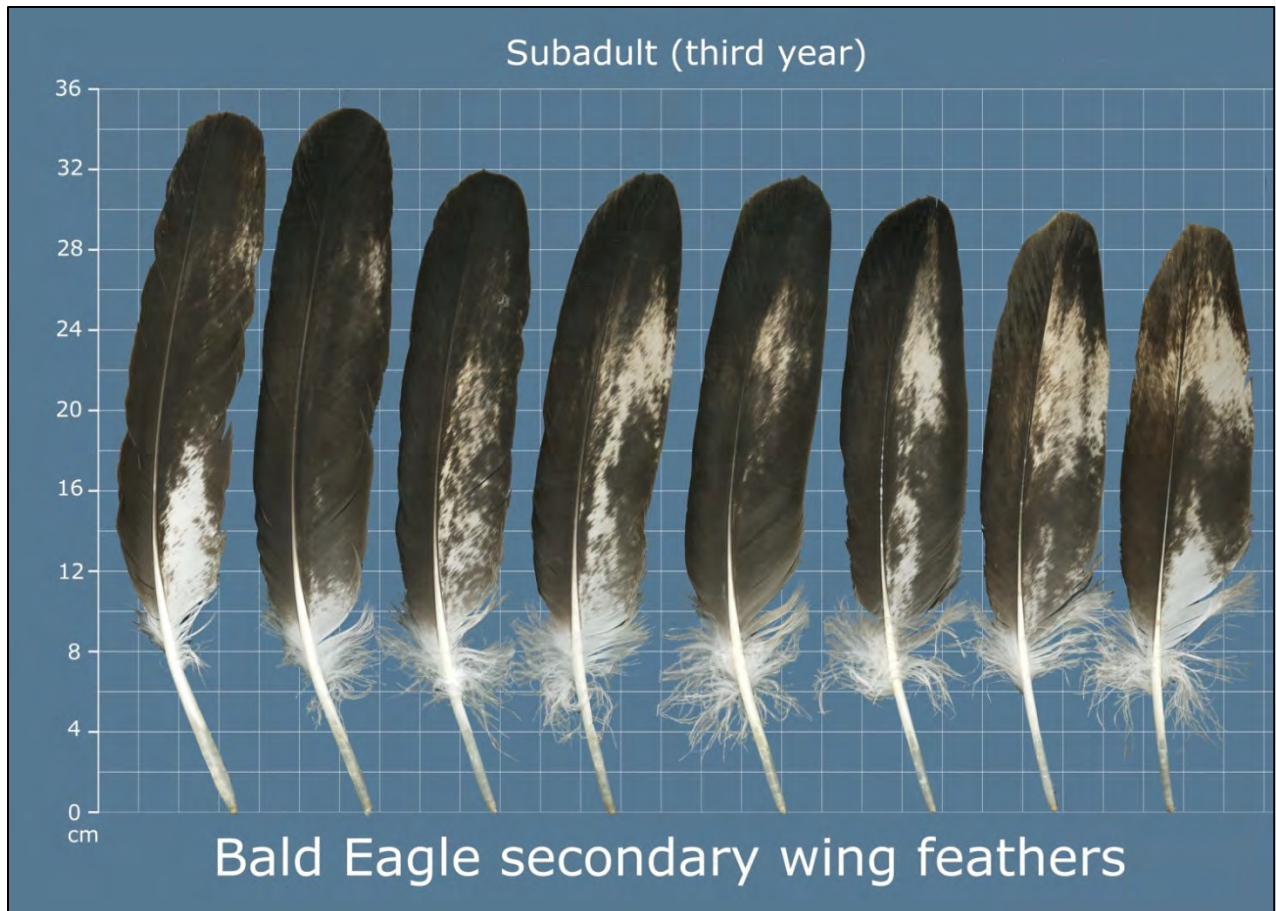
**Figure 3. Adult Bald vs. Golden primaries. Note the obvious marbling on Golden inner primaries.**



**Figure 4. Adult Bald vs. Golden secondaries. Note the obvious marbling on the Golden Eagle feathers.**



**Figure 5. Subadult Bald vs. Golden primaries. Note pale areas mottled with brown in both basal and terminal areas of Bald inner primaries versus large pure white basal areas on Golden.**



**Figure 6. Subadult Bald vs. Golden secondaries. Note white mottled with brown in both basal and terminal areas of Bald inner primaries versus large areas of pure white extending from bases of Golden. Note also the faint marbling visible on the terminal portions of the Golden Eagle secondaries.**



**Figure 7. Adult Bald vs. Golden tail feathers. The pure white tail feathers of adult Bald can be confused only with swans or domestic turkeys. The strong marbling pattern of adult Golden tail feathers is diagnostic.**





**Figure 8. Adult Golden Eagle tail feathers from two individuals, illustrating the range of variation in the marbling pattern. Compare to the Golden Eagle tail feathers in Fig. 7, which are more typical.**



**Figure 9. Subadult Bald vs. Golden tail feathers. The mottled pattern of the Bald feathers, with pale areas in the mid-vane area, contrasts with the strong Golden Eagle pattern of white bases and dark tips.**



**Figure 10. Subadult Bald vs. Golden tail feathers. Bald Eagle tail feathers become whiter in older birds, with dark patches persisting longest along shafts and at tips. Golden Eagle feathers become darker in older birds, with white patches restricted to the bases and marbling evident toward the tips.**

## EAGLE FEATHERS VS. THOSE OF OTHER LARGE BIRDS

**Shaft Characters.** The shafts of eagle and other raptor feathers are plain in appearance. The upper surfaces of the shafts are dark and unmarked, and there is only a narrow, V-shaped groove in the underside of the shafts. In contrast, turkey and other gamebird feathers have fine parallel lines in the upper surface of the shaft, and broad, U-shaped grooves on the undersurface. These shaft characters are illustrated in Figures 11 and 12.

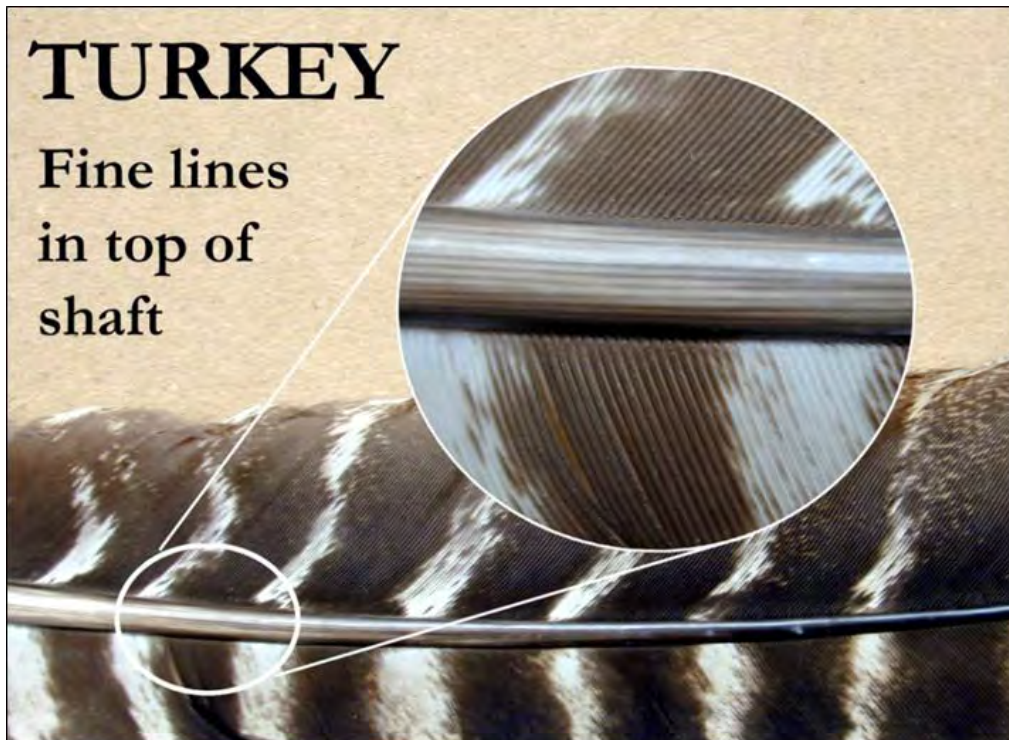
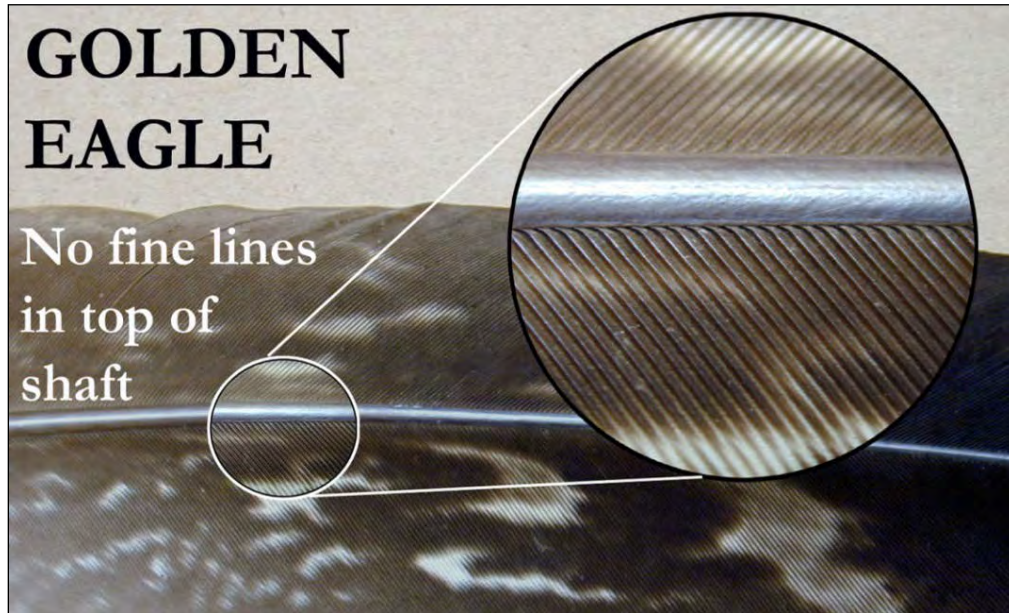


Figure 11. Fine lines in the upper surface of the shafts of turkey and other gamebird feathers distinguish them from eagle and other raptor feathers, which lack such lines.

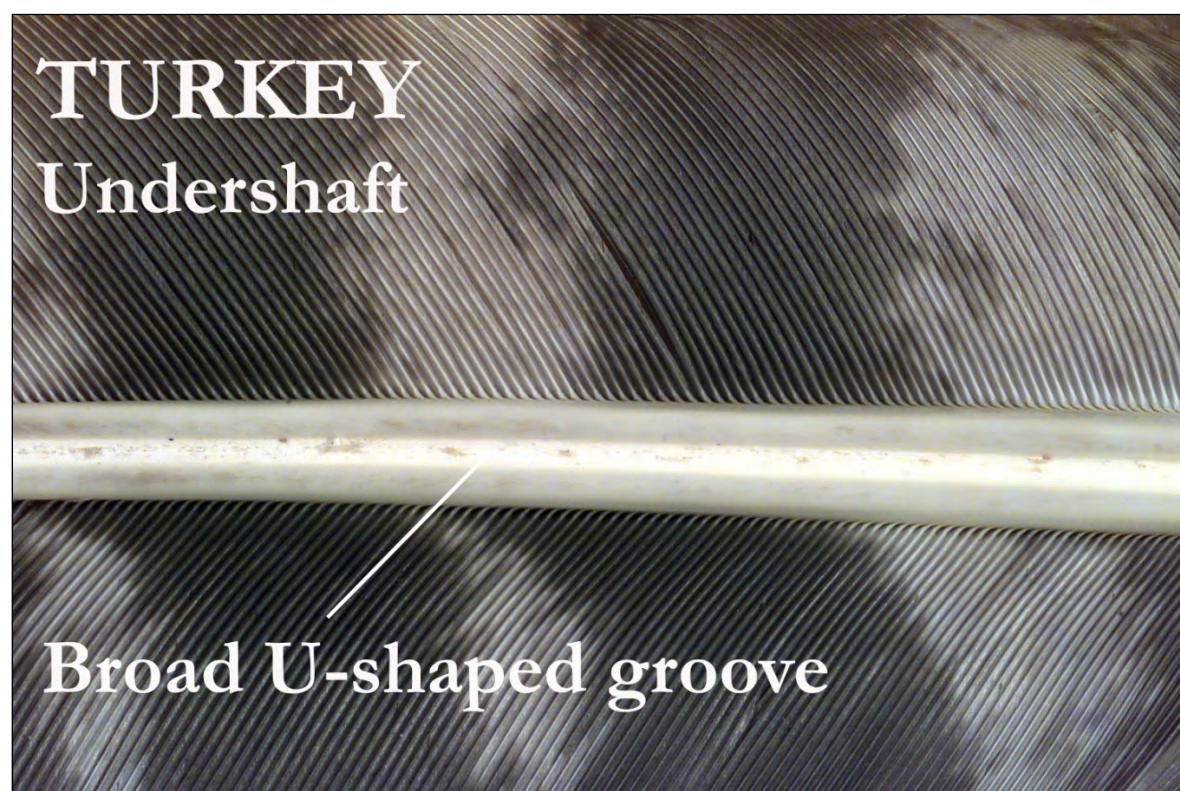


Figure 12. A broad U-shaped groove in the under surface of the shafts of turkey and other gamebird feathers distinguishes them from eagle and other raptor feathers, which exhibit only fine lines or narrow, V-shaped grooves.

**Size.** The large size of eagle flight feathers rules out many other species. Eagle flight feathers are almost always ten inches (26 cm) or more long, and even the shortest secondaries are at least eight inches (20 cm) total length. Therefore, any flight feathers shorter than eight inches are NOT eagle flight feathers. This includes, for example, the tail feathers of swans, geese, and Great Blue Herons, all of which are less than eight inches long. The Feather Atlas provides dimensions for the feathers of almost all large North American birds, allowing a check whether the feathers of a particular species falls within the size range for Bald and Golden Eagles.

**OTHER HAWKS AND EAGLES.** Both Bald and Golden Eagles have close relatives outside of North America. Therefore, if suspected eagle feathers are seized at ports of entry, it is appropriate to submit these to the Forensics Lab for identification. As a practical matter, non-North American eagle feathers are extremely rare in casework, and most wildlife officers will never encounter them.

All North American hawks (Accipitridae), including the Osprey (Pandionidae), are much smaller than Bald and Golden Eagles. In addition, almost all of these hawks exhibit barring or other patterns on their flight feathers that are distinctly different from the patterns of either North American eagle species (see the Feather Atlas for examples).

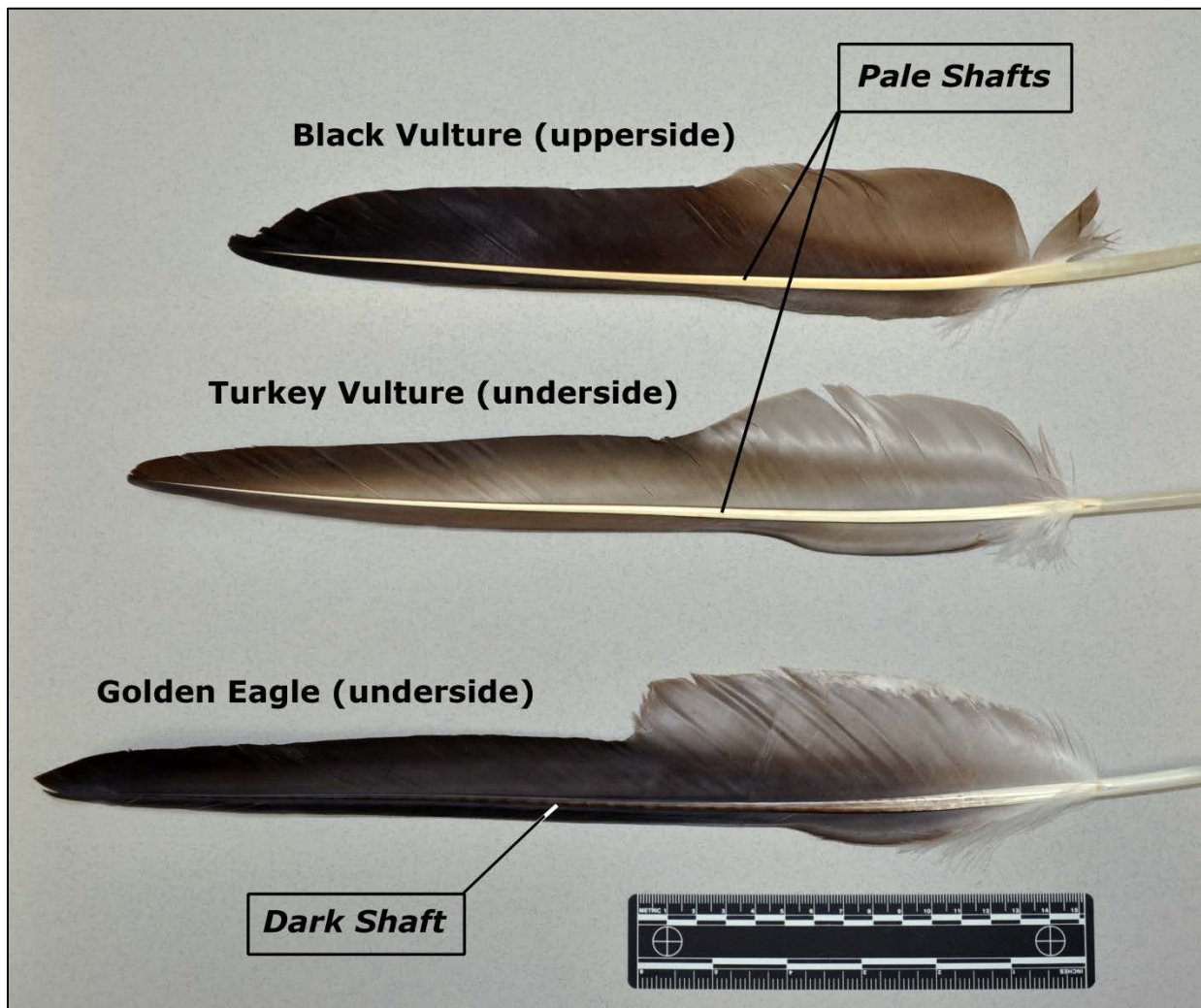
The one North American hawk whose feathers may be used to simulate eagle is the Rough-legged Hawk. Some forms of this species have pale tail feathers with dark tips, resembling those of juvenile Golden Eagles. However, they are much smaller: 8-10 inches (22-25 cm) vs 12-15 inches (30-38 cm) for Golden Eagle.



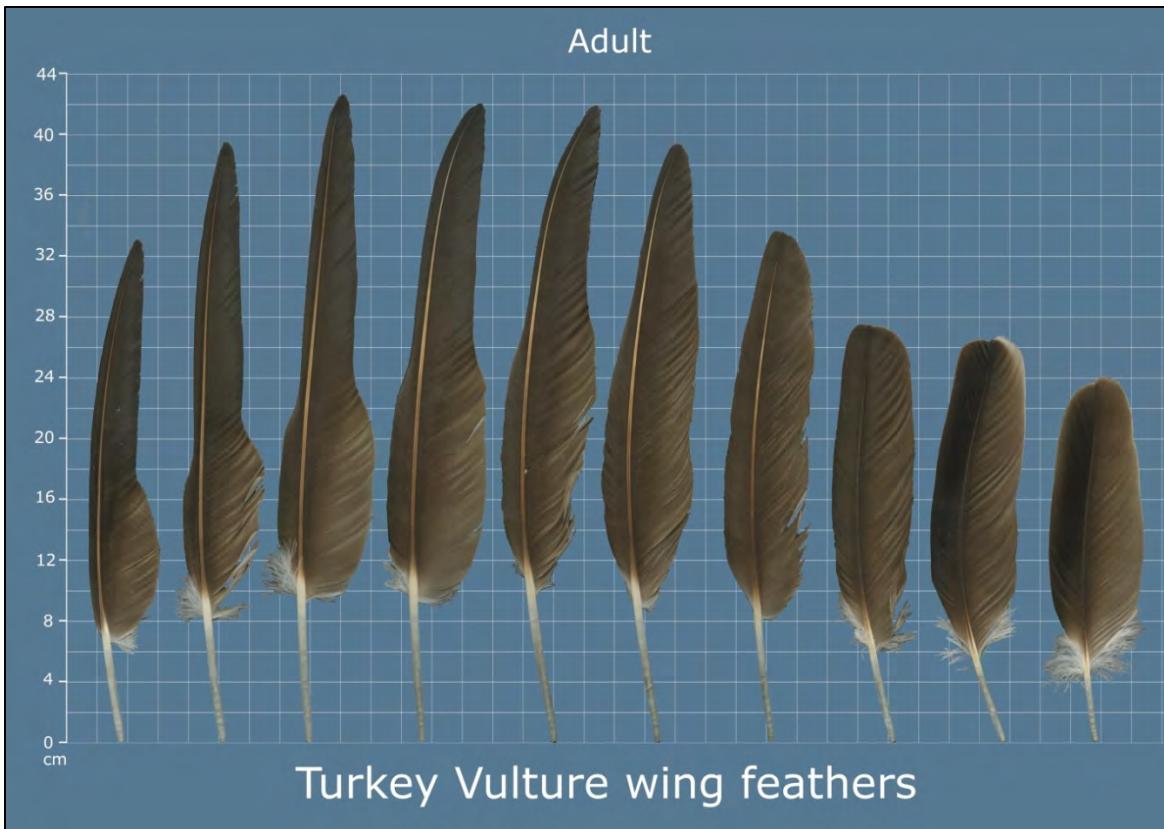
**Figure 13.** Tail feathers of juvenile light morph Rough-legged Hawk. Although the pattern resembles juvenile Golden Eagle, these feathers are much smaller (compare to Figs. 9 and 10).

**CONDORS.** California Condors and the Andean Condor of South America are huge vultures (Cathartidae), far larger than either Bald or Golden Eagles. Both condors are endangered species, and their feathers are rare in casework, but are occasionally seen. Size alone should distinguish condor vs. eagle feathers. Condor primaries are 17-27 inches (43-70 cm) long, compared to 12-21 inches (32-54 cm) for eagles; the outer primaries also have a strongly arched shape. Condor secondaries are 14-18 inches (37-45 cm) long, compared to 10-14 inches (26-36 cm) for eagles. Their tail feathers are over 15 inches (40 cm) long, vs. less than 15 inches for eagles. In addition, condor feathers are unpatterned black or dark gray-brown, with the exception of the secondaries of adult Andean Condors, which exhibit panels of velvety silver-gray. Condor feathers never exhibit marbling, mottling, or patches of white at the base of the vanes.

**BLACK AND TURKEY VULTURES.** These common North American vultures have unpatterned dark wing feathers that may be confused with adult Bald Eagle wing feathers or un-marbled outer Golden Eagle primaries. However, vulture feathers are smaller than comparable eagle feathers, have paler undervanes, and their shafts are pale, strongly contrasting with the feather vanes. Black Vultures have white shafts on both the upper and undersides of their flight feathers; Turkey Vultures usually have pale shafts only on the undersides.

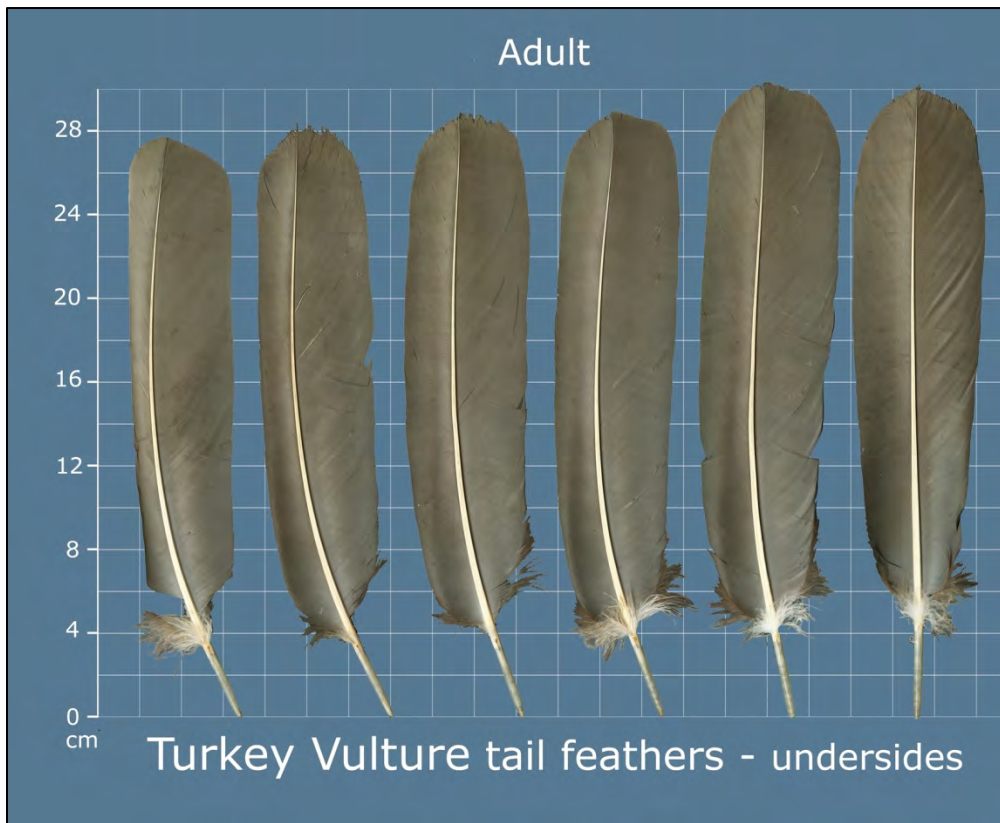


**Figure 14.** Primary flight feathers of Black and Turkey Vultures compared to Golden Eagle. Note the vultures' pale feather shafts, which contrast strongly with the color of the vanes. This is most obvious on the under-sides of the feathers.



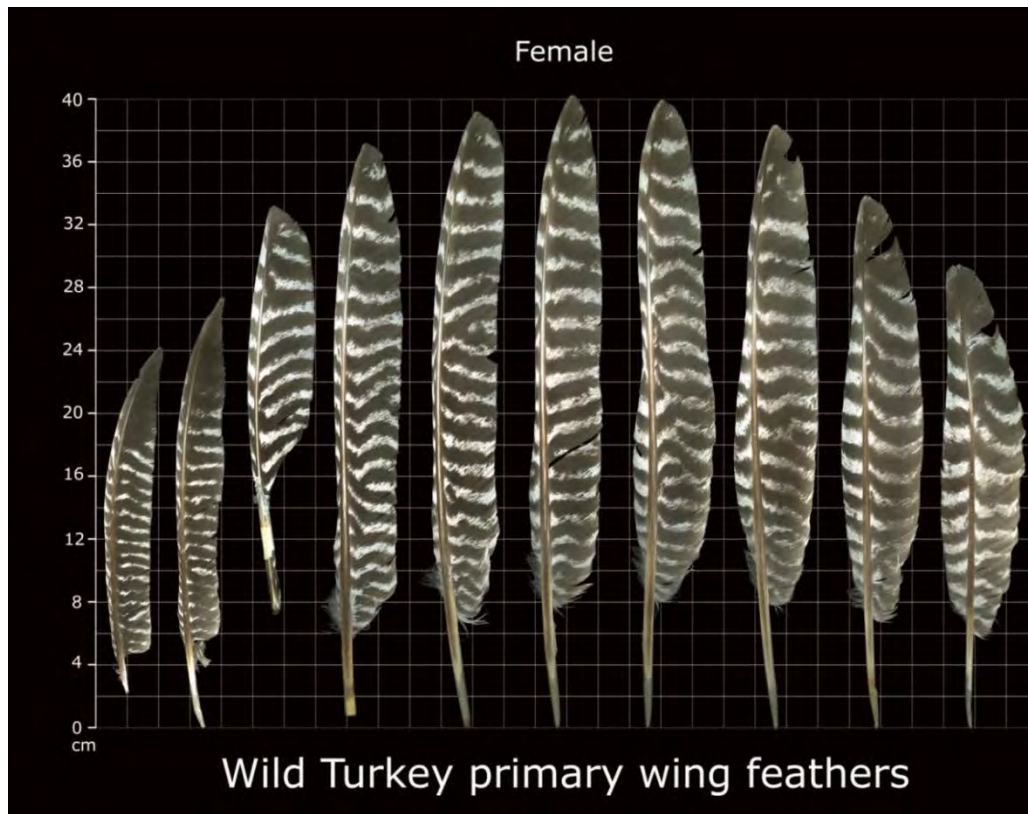
**Figure15. Turkey Vulture wing feathers, showing upper & under surfaces. Note the lack of marbling or other patterns, the small size relative to eagle feathers, and the pale shafts (most obvious on the undersides). These scans show seven primaries and three secondaries.**



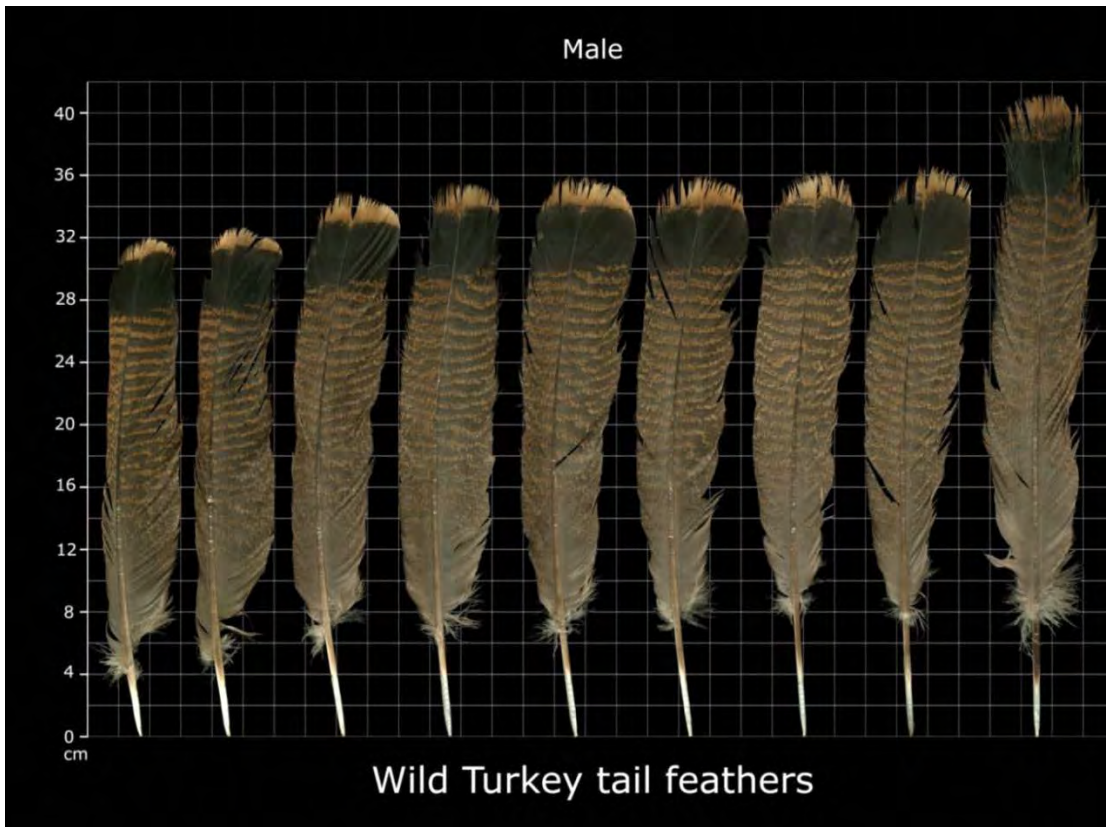


**Figure 16. Turkey Vulture tail feathers. Note the lack of patterning (eagle tail feathers always exhibit some patterning or are pure white in the case of adult Bald) and the pale shafts on the undersides.**

**TURKEY.** Wild Turkey feathers are unlikely to be confused with eagle: the wing feathers are strongly barred brown and white (Fig. 17), and the tail feathers are reddish-brown, barred, and have a squared tip with a broad black subterminal band (Fig. 18).



**Figure 17.** Primaries and secondaries of Wild Turkey. Note the strong brown-and-white barring, a pattern never seen on eagle feathers. When viewed edge-on, turkey primaries also have a strong arch, or camber, not seen on eagle feathers.



**Figure 18. Tail feathers of Wild Turkey - note squared tips, black subterminal bands, and narrow barring.**

However, some domestic turkey varieties have patterns that may resemble marbling (Fig. 19), and the tips can be trimmed to remove the dark subterminal band.



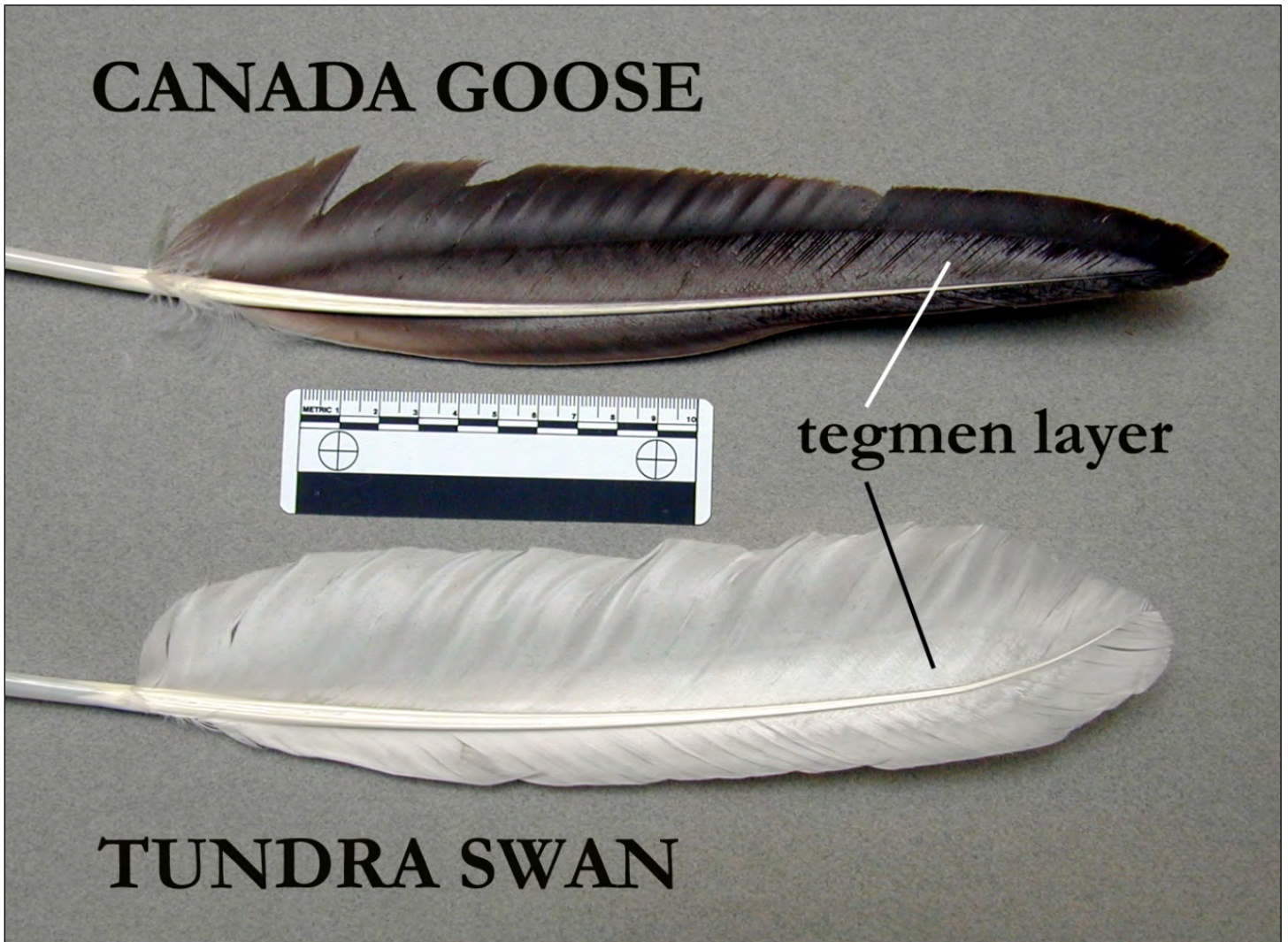
**Figure 19. Secondaries (on the left) and tail feathers (on the right) of various domestic turkey breeds. The fine speckling and marbling-like patterns could lead to confusion with Bald and Golden Eagles, respectively, especially if the feathers are trimmed to resemble eagle feathers in shape.**

Finally, the feathers of domestic white turkeys can be dyed to resemble eagle. These are by far the most common types of simulated eagle feathers. The dark dyed portion of such feathers is usually unnaturally uniform, lacking the subtle variation in shading of unmodified feathers. Close examination will also reveal fine lines in the upper surface of the feather shafts, and broad grooves in the underside of the shafts, as illustrated in Figs. 11 and 12.

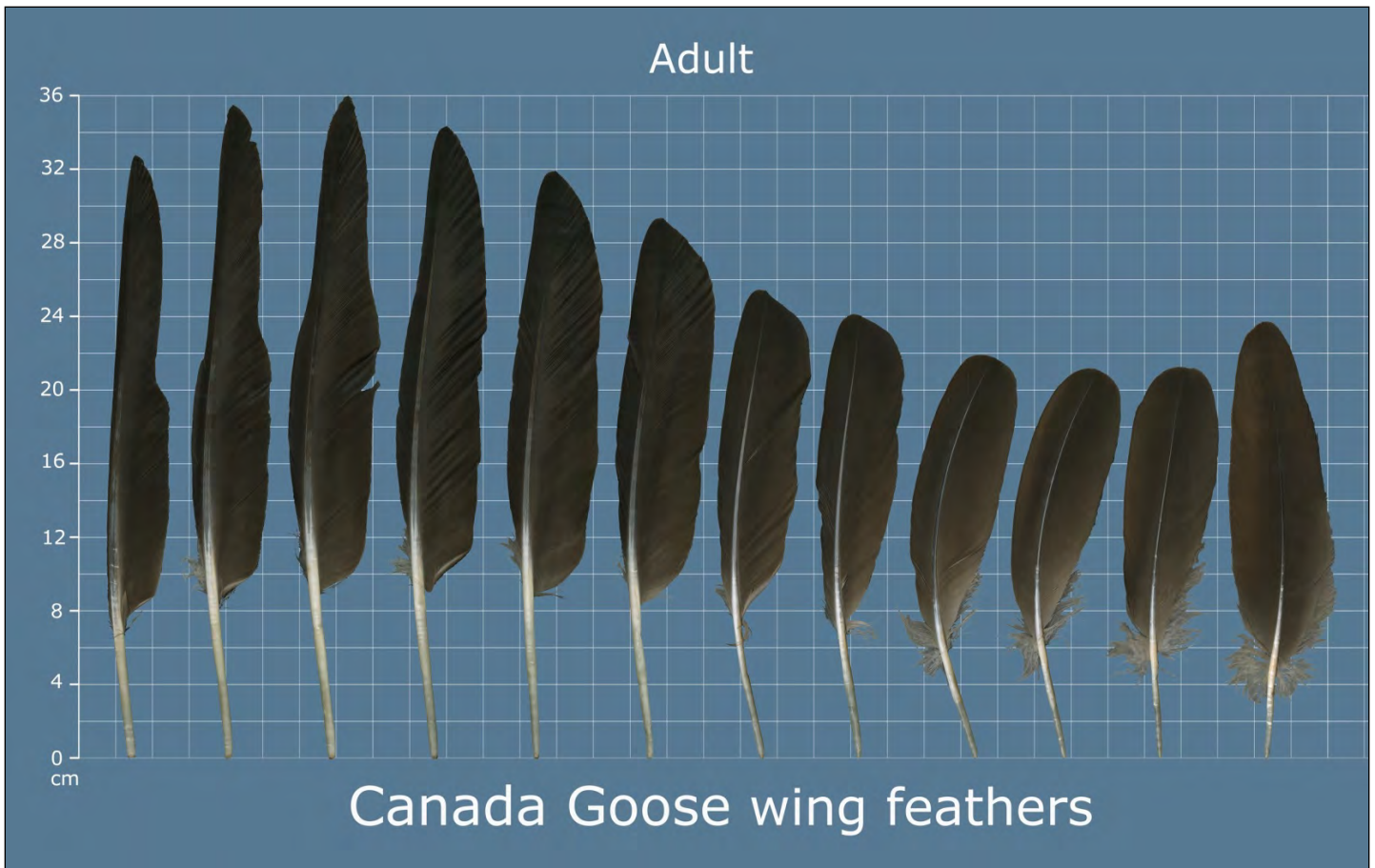


**Figure 20.** Wing feathers of white domestic turkey, with tips dyed to simulate subadult Golden Eagle feathers. Note the unnatural appearance of the dyed margin (compare with Golden Eagle feathers in Figs. 9 and 10). These turkey wing feathers also exhibit a distinct arch, or camber, when viewed from the side. This shape provides extra stiffness, necessary for heavy-bodied birds like turkeys, but is not seen on eagle feathers. Close examination of these turkey feather shafts would also reveal fine lines in the upper surface (see Fig. 11) and broad U-shaped grooves in the under-surface (see Fig. 12).

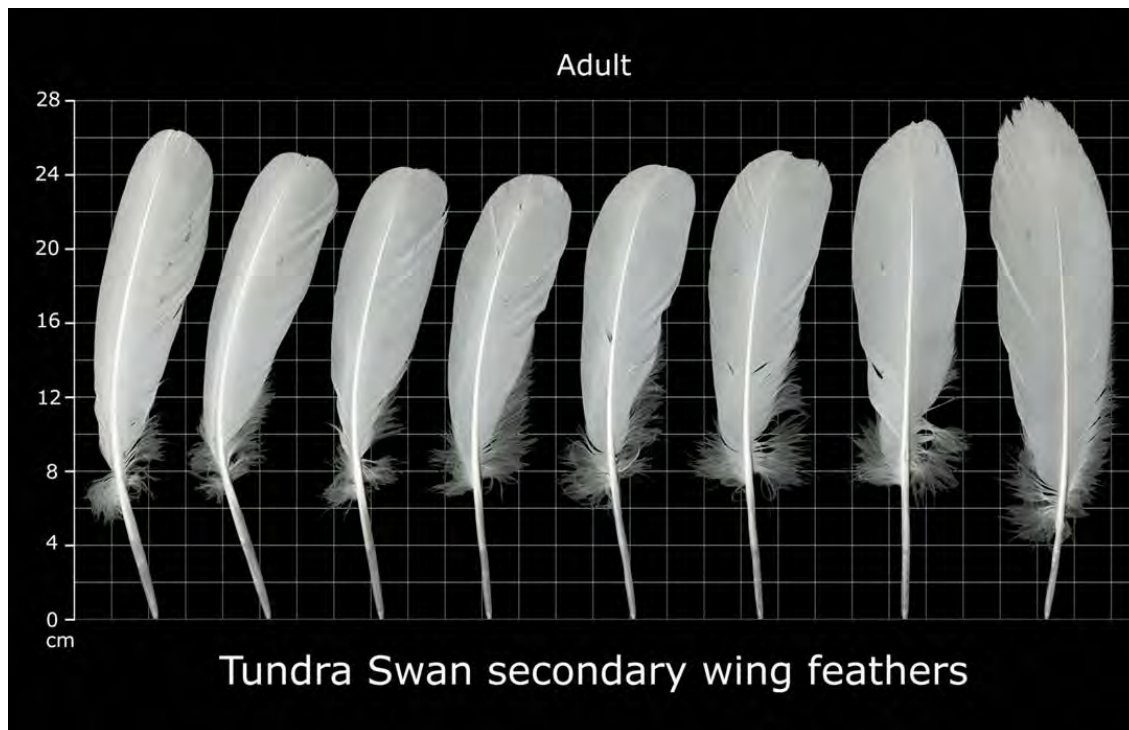
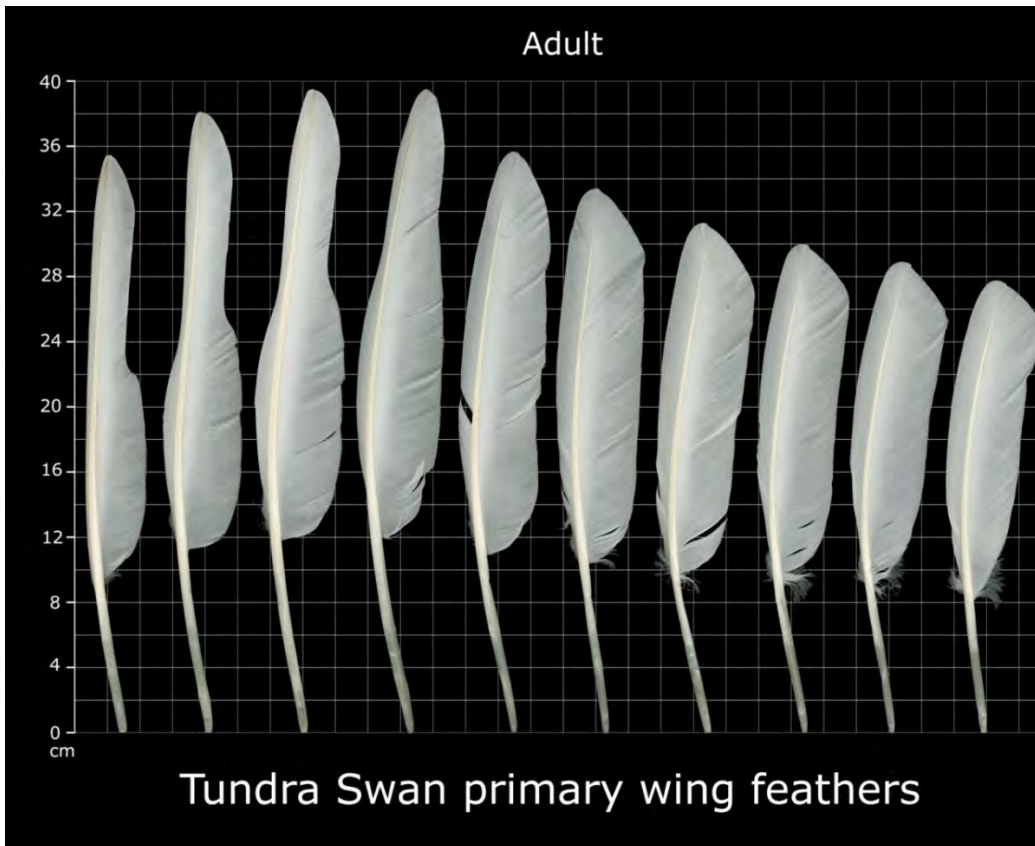
**GEESE AND SWANS.** The unpatterned dark brown wing feathers of large races of Canada Goose may be confused with adult Bald Eagle wing feathers or un-marbled outer Golden Eagle primaries. The relatively rounded inner primaries of swans can be confused with adult Bald Eagle tail feathers. However, all waterfowl primaries can be easily distinguished from eagle feathers by the shiny “tegmen” layer on the under-vanes (see Fig. 21 below). Tegmen is characteristic of waterfowl primaries, but does not occur on eagle feathers. Goose secondaries and tail feathers lack tegmen, but can be distinguished from eagle feathers by their smaller size.



**Figure 21.** Shiny tegmen layer on the undersurface of waterfowl primaries. This is never seen in eagles.

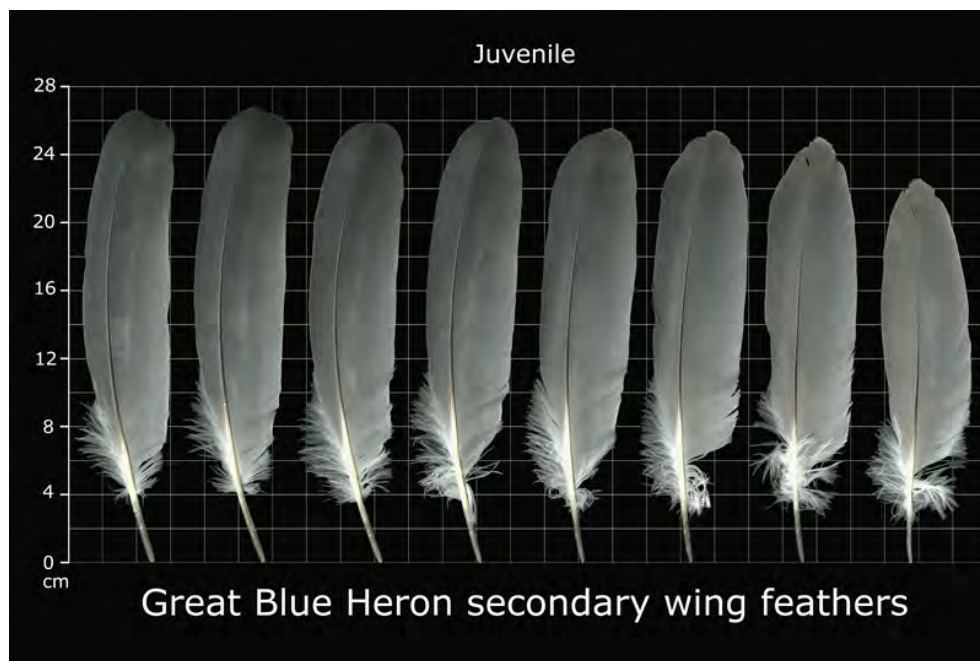
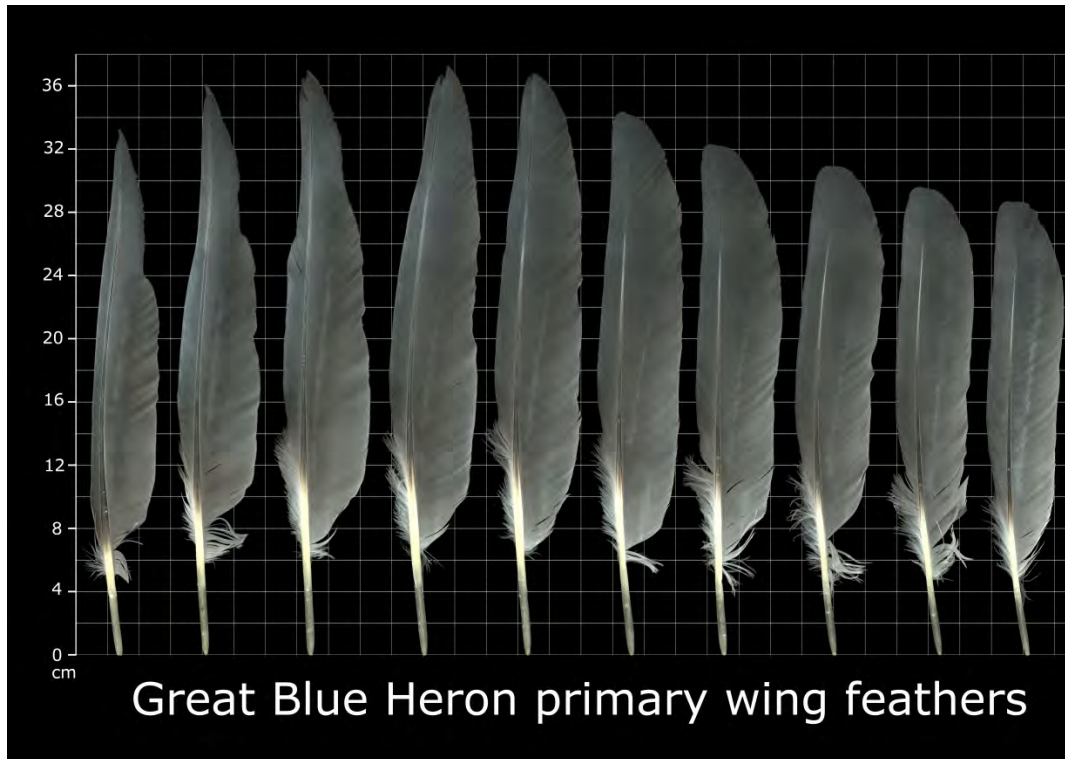


**Figure 22. Canada Goose wing and tail feathers (of the mid-sized “Dusky” subspecies). Eight primaries and four secondaries are shown in the upper scan. Primaries possess tegmen on their undersides (not visible in this upper-surface scan), which rules out eagle. Secondaries and tail feathers are too small for eagle feathers (compare size with the unpatterned Bald Eagle secondaries in Fig. 4).**



**Figure 23. Tundra Swan primaries and secondaries.** The inner primaries somewhat resemble tail feathers in shape, but they possess tegmen on the under-surface of the vanes (not visible in this upper-surface scan), ruling out adult Bald Eagle tail feathers. Note also the very long quills of swan wing feathers compared to Bald Eagle tail feathers (see Fig. 7). Swan tail feathers are far too small for eagle (< 20 cm).

**GREAT BLUE HERON.** The wing feathers of this species can be confused with adult Bald Eagle, as they are also unpatterned blue-gray. However, Great Blue Heron flight feathers differ in the following ways: they are slate blue (paler and less brown than Bald Eagle feathers); are significantly smaller than comparable eagle feathers; and the primaries have at most only short narrowed tips (very different from the elongated “fingers” on eagle outer primaries). Great Blue Heron tail feathers should not be confused with eagle, as they are only about half the length of eagle feathers and lack any marbled or spattered patterning or patches of white.



**Figure 24. Great Blue Heron wing feathers. Note the uniform blue-gray color, lack of patterning, and small size compared to eagle feathers.**



**COMMON RAVEN:** All raven feathers are black, often with a glossy blue sheen. Bald and Golden Eagle feathers may be dark gray or brown, but are never truly black. Raven feathers are also significantly smaller and more slender than comparable eagle feathers.



**Figure 25. Common Raven primaries and tail feathers. Note the solid black color and small size compared to eagle feathers. Raven secondaries are 7-9 inches (18-22 cm), too small for eagle.**

## **TABLE 1. SUMMARY OF EAGLE FEATHER IDENTIFICATION TIPS**

### **TO IDENTIFY SPECIES OF EAGLE:**

#### **Feather CANNOT be from Bald Eagle if:**

- “Marbling” pattern of paler bars and swirls is present in dark brown feather.  
⇒ It is adult Golden Eagle (Fig. 3, 4, 7, 8)
- There is a large pure-white area at the base of the feather and a dark tip.  
⇒ It is subadult Golden Eagle (Fig. 5, 6, 9, 10)

#### **Feather CANNOT be from Golden Eagle if:**

- It is pure white.  
⇒ It is an adult Bald Eagle tail feather (Fig. 7)
- It has white areas mottled with brown and surrounded by dark areas.  
⇒ It is subadult Bald Eagle (Fig. 5, 6, 9, 10)

### **TO RULE OUT EAGLE:**

#### **Feather CANNOT be from eagle if:**

- A waxy “tegmen” layer is present on the underside of the feather along the shaft.  
⇒ It is waterfowl (Fig. 21)
- There are fine lines running along the shaft on the top of the feather.  
⇒ It is gamebird (most likely) or waterfowl (Fig. 11)
- There is a broad, U-shaped groove in the shaft on the underside of the feather.  
⇒ It is gamebird (most likely) or waterfowl (Fig. 12)
- There is a strong contrast between a white feather shaft and surrounding darker vanes.  
⇒ It is vulture (most likely) (Fig. 14, 15, 16)

### **STILL UNCERTAIN? CHECK FEATHER SIZES ON THE FEATHER ATLAS**

- Eagle flight feathers are larger than the corresponding feathers of all other North American birds of prey, as well as ravens, herons, and most other North American birds (see p. 14)
- Eagle flight feathers are smaller than the corresponding feathers of California and Andean Condors (see p. 15).