Notes

Identifying Bald Versus Golden Eagle Bones: A Primer for Wildlife Biologists and Law Enforcement Officers

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Abstract

Remains of bald eagles *Haliaeetus leucocephalus* and golden eagles *Aquila chrysaetos* are regularly encountered in avian mortality surveys and wildlife crime investigations. These species exhibit well-documented plumage differences, allowing identification in most instances when feathers are present. However, skeletal remains are much more difficult to identify and may be the only material available after mortality events (e.g., decomposed remains associated with power lines or wind turbines). Eagle bones are also sometimes incorporated into crafted items without other associated remains. I describe and illustrate shape-based osteological characters that have been determined to be reliable for distinguishing most major bones of bald versus golden eagles. Using the annotated photographs provided as a guide, nonspecialists will be able to identify eagle skeletal remains with high accuracy. This information will be of interest to wildlife law enforcement officers; state, federal, and tribal wildlife biologists documenting avian mortality; and anthropologists and archaeologists.

Keywords: bald eagle; golden eagle; bones; osteology; mortality; forensics; morphology

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Introduction

Bald eagles *Haliaeetus leucocephalus* and golden eagles *Aquila chrysaetos* are North America's largest birds of prey, with the exception of the endangered California condor *Gymnogyps californianus*, and they are emblematic of America's wildlife heritage. Both eagle species are federally protected under the Migratory Bird Treaty Act (MBTA 1918, as amended) and Bald and Golden Eagle Protection Act (BGEPA 1940, as amended). There is continuing strong demand from Native Americans for eagle feathers and other parts using cultural and religious practices (Iraola 2004), which the U.S. Fish and Wildlife Service (USFWS) provides to members of federally recognized tribes through the National Eagle Repository (USFWS Eagle Repository).

The status of bald and golden eagle populations is of great public interest. Both species are widely distributed and occur sympatrically in many areas, especially in western North America (Buehler 2000; Kochert and Steenhof 2002). The bald eagle, the United States' national bird, suffered drastic population declines in the 20th century, due especially to the effects of the organochlorine pesticide dichlorodiphenyltrichloroethane (DDT) on reproduction (Buehler 2000). Populations in the lower 48 states were listed as threatened in 1978 under the Endangered Species Act (ESA 1973, as amended). The bald eagle was removed from the Endangered Species list in 2007 due to remarkable population recovery as DDT contamination declined (USFWS 2007), and its numbers continue to increase (USFWS 2016a).

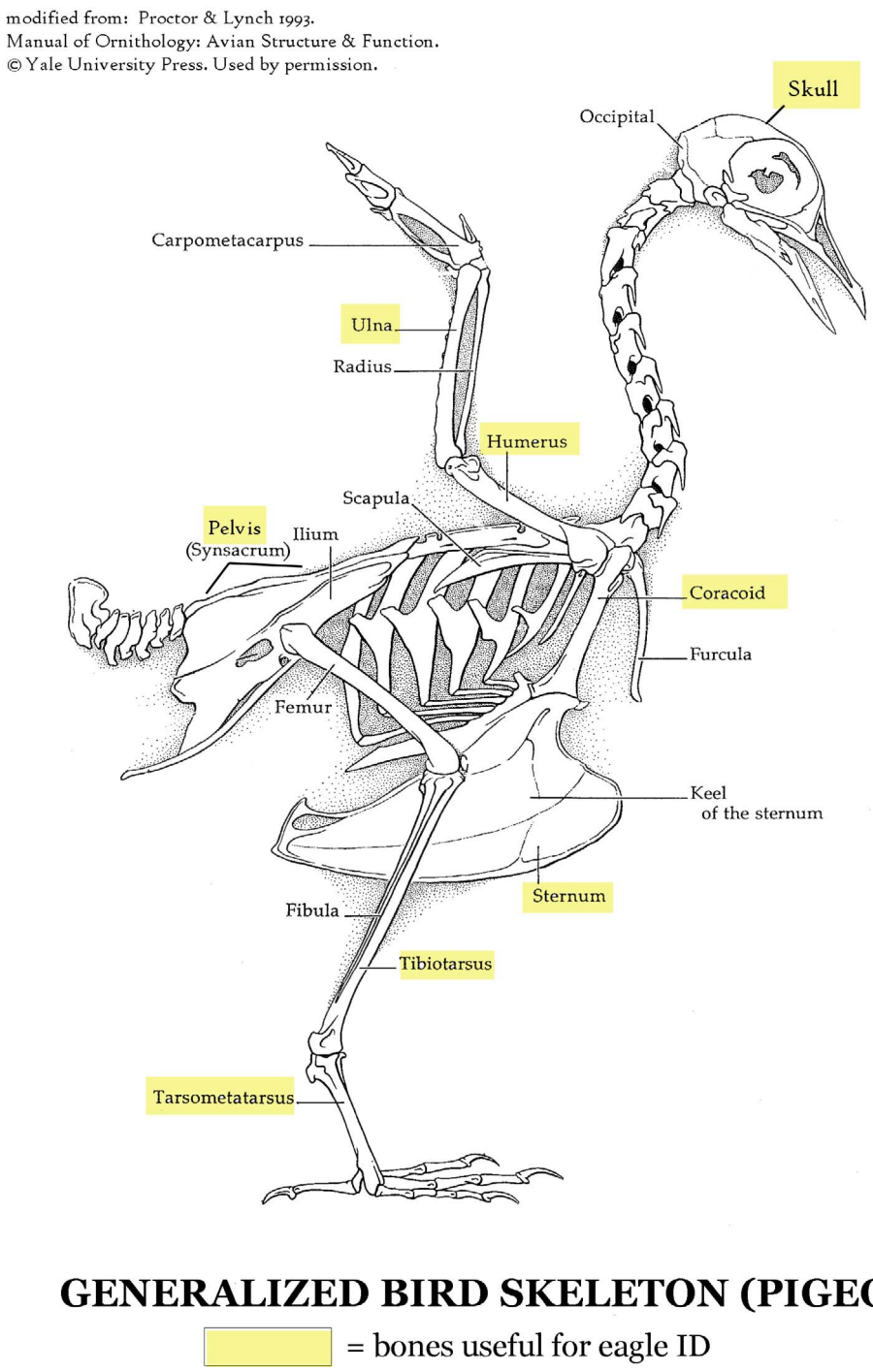

Figure 1. Diagram of pigeon skeleton, highlighting the bones described in this paper. See France (2017) and http://www.royalbcmuseum.bc.ca/Natural_History/Bones/Species-Pages/BAEA.htm and http://www.royalbcmuseum.bc.ca/Natural_History/Bones/Species-Pages/GOEA.htm for photographs of the bones of bald eagles *Haliaeetus leucocephalus* and golden eagles *Aquila chrysaetos*.

Although never listed under the Endangered Species Act, the golden eagle has long been recognized as vulnerable to human activities. Most recorded deaths are anthropogenic, including shooting, electrocution, and lead poisoning (Russell and Franson 2014; USFWS 2016a). Recent reviews concluded that U.S. golden eagle populations are either stable (Millsap et al. 2013) or slowly declining (USFWS 2016a).

There is growing concern about eagle mortality at wind energy facilities (Smallwood and Thelander 2008; Pagel et al. 2013; USFWS 2016b). Such facilities are rapidly expanding, including in formerly undeveloped areas occupied by golden eagles. As a result, efforts are

Table 1. Lengths of major skeletal elements of large North American raptor species (means ± SD, with ranges in mm). See Figure 1 for diagram illustrating the positions of these bones in the avian skeleton. All measurements were taken in 2016 and 2017 from specimens in the collection of the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon. Sample sizes for each species vary depending on the element. Additional measurement data for the bones of most of these species can be found at http://www.royalbcmuseum.bc.ca/Natural_History/Bones/homepage.htm. Accessed: 2017-11-15. (Archived by WebCite® at http://www.webcitation.org/6v01K0mBX). (Table is extended on page 599.)

Bone (total length, mm)	Bald eagle *Haliaeetus leucocephalus*, $n = 11–19$	Golden eagle *Aquila chrysaetos*, $n = 12–24$	Osprey *Pandion haliaetus*, $n = 8–13$	Red-tailed hawk *Buteo jamaicensis*, $n = 27–41$
Skull	123.4 ± 8.20 (100–134)	115.9 ± 4.08 (111–127)	77.3 ± 3.62 (70–82)	83.4 ± 3.02 (77–89)
Pelvis	127.2 ± 9.13 (100–140)	119.9 ± 5.86 (112–132)	76.9 ± 5.47 (70–87)	75.9 ± 4.59 (65–83)
Sternum	131.1 ± 8.45 (102–143)	112.0 ± 6.80 (100–126)	73.0 ± 5.67 (64–80)	64.4 ± 4.19 (53–73)
Coracoid	79.6 ± 5.38 (69–88)	75.3 ± 3.60 (70–81)	48.7 ± 2.78 (44–53)	47.6 ± 2.58 (41–52)
Humerus	201.1 ± 10.79 (180–215)	192.5 ± 7.83 (179–200)	143.7 ± 4.44 (137–150)	111.9 ± 4.88 (101–120)
Ulna	233.5 ± 12.13 (215–250)	213.2 ± 7.94 (200–230)	182.2 ± 5.63 (175–190)	131.1 ± 5.88 (120–141)
Tibiotarsus	152.7 ± 7.40 (138–165)	164.4 ± 5.79 (159–175)	124.6 ± 3.41 (120–130)	114.9 ± 5.52 (103–125)
Tarsometatarsus	91.6 ± 5.71 (80–99)	99.9 ± 2.03 (97–104)	52.3 ± 2.09 (50–55)	86.7 ± 4.17 (80–95)

ongoing at the state, federal, and tribal levels to conduct avian mortality surveys at wind energy sites and along powerlines. Definitive species identification is essential in such mortality surveys, as well as in examination of evidence in wildlife law enforcement investigations.

Bald and golden eagles differ strongly in adult plumage, but their variable juvenile and subadult plumages are more similar. Field guides and specialized raptor identification books (e.g., Clark and Wheeler 2001; Wheeler 2003) provide detailed descriptions and photographs, allowing identification of these two species in all plumages with certainty. Even when eagle remains consist only of isolated feathers, as is frequently the case with wildlife law enforcement evidence, identification is almost always possible (Trail 2014; USFWS Feather Atlas).

In contrast, comparatively little information is available on the identification of the bones of bald and golden eagles (but see Appleton et al. 2016 for identification of detached eagle talons). Skeletal remains are sometimes the only material recovered in avian mortality surveys, due to the effects of decomposition and exposure. Crafted items seized in wildlife crime investigations may also include eagle bones without associated feathers. Bald and golden eagles overlap in size and share many skeletal similarities, due to shared predatory habits and to common ancestry as members of the family Accipitridae. Thus, osteological differences are relatively subtle. A thoughtful discussion of the challenges involved in the identification of osteological remains is provided by Driver (1992). Although bone identification is ideally carried out using a comparative skeleton reference collection (Lyman 2010), such collections are not readily available to nonspecialists.

Drawings and photographs of various bones of bald and golden eagles can be found in general osteological works (Howard 1929; Gilbert et al. 1981; Baumel and Witmer 1993; EDM International 2004; France 2017) and on the "Avian Osteology" website (Royal British Columbia Museum, Victoria, British Columbia, Canada), but none of these sources indicate species-diagnostic characters. McKusick (2001) provides a guide to the comparative osteology of bald and golden eagles for archaeologists, illustrated with line drawings, but this excellent publication is not widely available. There is no comparative identification guide to the bones of bald and golden eagles suitable for nonspecialists, such as wildlife biologists and law enforcement officers.

I summarize shape-based characters that allow differentiation of most of the major bones of bald versus golden eagles. These diagnostic characters are illustrated with annotated photographs, enabling examiners in the field and at facilities without specimen collections to accurately identify eagle remains that include multiple major bones. This guide assumes that sufficient remains are present to verify that the bones represent an eagle; for example, at least a partial skull, or a foot with large raptorial talons. Information on how to recognize eagle bones versus those of other large birds, such as swans *Cygnus* spp., turkeys *Meleagris* spp., pelicans *Pelecanus* spp., and cranes *Antigone* and *Grus* spp. can be found in general avian osteology references (e.g., Gilbert et al. 1981; Baumel and Witmer 1993). It is important to note that the eagle bone characters described here are useful only when the remains are known to be North American in origin; that is, they are either bald or golden eagle. Non–North American species of *Haliaeetus* and *Aquila* are not considered.

Methods

All major skeletal elements of bald and golden eagles in the skeleton reference collection of the National Fish and Wildlife Forensics Laboratory (NFWFL) were examined and compared. Sample sizes ranged from 10 to 24 individuals of each species for the different elements examined. Based on this initial examination, the following bones were excluded from the study due to their close resemblance between bald and golden eagles: furcula, scapula, radius, carpometacarpus, and femur (Figure 1). Although experienced examiners with access to a collection of eagle skeletons may be able to make identifications based on these bones, they are too similar to be useful for law enforcement officers or wildlife biologists in the field.

The remaining eight major skeletal elements exhibited species-diagnostic shape characters. These were the skull, sternum, pelvis (synsacrum), coracoid, humerus,

Table 1. Extended.

Ferruginous hawk *Buteo regalis*, $n = 8–15$	Northern goshawk *Accipiter gentilis*, $n = 5–14$	Turkey vulture *Cathartes aura*, $n = 10–14$	Great horned owl *Bubo virginianus*, $n = 17–23$
92.5 ± 3.69 (85–96)	72.1 ± 3.96 (66–80)	93.7 ± 3.77 (86–100)	89.4 ± 3.57 (84–97)
90.6 ± 5.37 (81–99)	69.9 ± 4.27 (63–77)	94.9 ± 2.96 (92–102)	81.1 ± 6.26 (69–91)
77.2 ± 4.07 (70–83)	78.8 ± 4.66 (73–88)	78.5 ± 5.26 (65–84)	59.1 ± 3.26 (52–66)
54.1 ± 2.75 (49–59)	48.5 ± 2.44 (45–55)	63.6 ± 2.06 (60–67)	55.7 ± 3.40 (53–61)
129.1 ± 5.67 (120–138)	94.0 ± 3.37 (90–100)	150.0 ± 5.82 (140–161)	128.4 ± 6.75 (115–137)
152.8 ± 4.86 (146–160)	105.6 ± 3.85 (100–110)	178.9 ± 7.95 (165–190)	145.9 ± 8.05 (130–157)
122.2 ± 4.83 (115–130)	101.8 ± 6.07 (96–115)	120.5 ± 3.13 (113–125)	121.1 ± 4.34 (114–128)
87.1 ± 2.36 (84–90)	76.6 ± 4.69 (71–85)	68.3 ± 3.41 (59–71)	61.4 ± 1.84 (59–66)

ulna, tibiotarsus, and tarsometatarsus (Figure 1). A representative example of each element was photographed, and photographs were annotated to highlight diagnostic characters. The annotated photographs were then provided to six volunteers to test their utility. These volunteers had varying backgrounds in biology (from no training to a PhD in mammalogy), but none had prior experience examining eagle bones. They were thus appropriate surrogates for the range of intended users of these identification materials. For each skeletal element, the volunteers were provided with unmarked mixed samples from the two eagle species and asked to identify the bones to species by using the annotated photographs as a guide. This process was useful for refining identification materials. Several potential distinguishing characters were found to be difficult to assess reliably, and they were rejected. The characters presented are those most reliably assessed in these tests. Quantitative data were also collected on these eight skeletal elements for both eagle species and six other large North American raptor species in the NFWFL collection. Total lengths (in millimeters) were measured for each element by using digital calipers.

Results and Discussion

Size alone is sufficient in almost all cases to avoid confusion between eagle bones and bones of other North American raptors (Table 1; Table S1, *Supplemental Material*). However, there is extensive overlap in bone sizes of the two eagle species. Due to this size overlap, compounded by sexual dimorphism and geographic variation, field identification of the bones of bald versus golden eagles should not be based on quantitative characters.

When examining suspected eagle bones, once smaller raptor species are ruled out, it is necessary to exclude large nonraptorial birds. The skulls of nonraptorial birds are clearly different from those of raptors and will be sufficient to exclude eagle if they are present. If skulls are lacking, there are several nonraptorial North American birds whose postcranial bones are large enough for potential confusion with those of bald and golden eagles (Table 2). The sterna and pelves of eagles are quite different from those of nonraptors; so, comparison of the illustrations in this guide with unknown sterna and pelves should allow eagles to be ruled in or out. If only limb bones of a large, unknown bird are present, identification should not be attempted without access to a collection of verified reference specimens.

I prepared annotated photographs of the skull, sternum, pelvis, coracoid, humerus, ulna, tibiotarsus, and tarsometatarsus of bald and golden eagles, highlighting species-diagonostic shape characters (Figures 2–10). The informative shape characters for each element are described below. Tests with untrained volunteers demonstrated the utility of these characters for distinguishing bald and golden eagles (Table 3). Seven of the eight elements were correctly assigned to species in

Table 2. Range of lengths (in mm) for selected limb bones of some large nonraptorial North American birds. Data from Gilbert et al. (1981). These species are large enough for possible confusion with bald eagles *Haliaeetus leucocephalus* and golden eagles *Aquila chrysaetos*, if no skull or feathers are present. Photographs were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

Bone	Tundra swan *Cygnus columbianus*, $n = 4$	Canada goose *Branta canadensis*, $n = 7$	Wild turkey (male) *Meleagris gallopavo*, $n = 64$	American white pelican *Pelecanus erythrorhynchos*, $n = 5$	Great blue heron *Ardea herodias*, $n = 8$	Whooping crane *Grus americana*, n= 5	Sandhill crane *Antigone canadensis*, $n = 11$
Coracoid	90–102	71–83	101–117	120–141	72–82	95–98	66–77
Humerus	242–273	164–181	147–163	284–321	187–189	252–265	183–204
Ulna	240–257	157–172	144–159	319–366	208–224	282–295	204–231
Tibiotarsus	193–224	141–160	145–206	175–189	225–243	326–350	210–268
Tarsometatarsus	109–124	82–94	144–169	113–125	164–176	281–297	165–235

Table 3. Accuracy of species identification of bald eagle *Haliaeetus leucocephalus* (BE) and golden eagle *Aquila chrysaetos* (GE) bones in blind tests by six volunteers. The untrained volunteers were provided with annotated photographs illustrating species-diagnostic characters (Figures 2–10) as a guide for making their identifications. Photographs were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

Bone (character)	Bald eagle, *n*	Golden eagle, n	Volunteer A	Volunteer B	Volunteer C	Volunteer D	Volunteer E	Volunteer F	% Error (no./total)
Skull (interorbital septum)	17	22	All correct	All correct	All correct	All correct	All correct	All correct	0
Skull (postorbital process)	17	22	All correct	All correct	All BE correct 1 GE as BE	All correct	All correct	All BE correct 1 GE as BE	1 (2/234)
Pelvis	17	22	All BE correct 4 GE as BE	All correct	All correct	All correct	All correct	1BE as GE All GE correct	2 (5/234)
Sternum	16	24	All BE correct 2 GE as BE	All BE correct 1 GE as BE	All BE correct 1 GE as BE	All correct	All correct	All correct	2 (4/240)
Coracoid	16	21	1 BE as GE 1 GE as BE	All correct	All correct	All correct	All correct	All correct	1 (2/222)
Humerus	16	18	1 BE as GE All GE correct	All BE correct 3 GE as BE	All BE correct 1 GE as BE	All correct	All BE correct 2 GE as BE	All BE correct 2 GE as BE	4 (9/204)
Ulna	10	12	3 BE as GE 2 GE as BE	2 BE as GE 1 GE as BE	All correct	All correct	All correct	All BE correct 1 GE as BE	7 (9/132)
Tibiotarsus	14	11	All BE correct 2 GE as BE	All correct	3 BE as GE 3 GE as BE	All correct	All correct	All correct	5 (8/150)
Tarsometatarsus	12	12	All correct	All correct	All correct	All correct	All BE correct 1 GE as BE	All correct	1 (1/144)

≥95% of comparisons, with only the ulna slightly below that level, at 93%. All the volunteers made identifications with high accuracy, ranging from 95 to 100% correct species assignments for all bones combined.

Each of the skeletal elements was presented separately in these identification tests. Under field conditions, eagle remains will usually include multiple bones, and species identification should be based on the examination of all informative skeletal elements. This should allow discrimination of the two eagle species in almost every case.

Skull: lateral view (Figure 2)

When viewed from the side, bald eagle skulls have a solid interorbital plate of bone. Golden eagle skulls, in contrast, exhibit an obvious "window" (fenestra) in this interorbital septum. There are also characters of the beak that should be assessed. Bald eagle beaks are more massive, often appearing bulbous, and they are covered with a yellow keratinous sheath in adult and many subadult birds. Golden eagle beaks are always dark and are less massive than those of bald eagles. These beak characters should not be relied on exclusively, however. The shape is difficult to evaluate without direct comparison, and juvenile and some subadult bald eagles have dark beaks. In addition, the beaks of skulls recovered in the field are often damaged or lack the keratinous sheath.

Skull: occipital view (Figure 3)

When viewed from the back (occipital view), there are obvious differences in the shape of the two species' postorbital processes. These are the bony projections behind the skull's eye orbits. Bald eagles have slender, pointed postorbital processes, whereas golden eagles have broad plates. In occipital view, this produces a wide opening below the process in bald eagle skulls versus a narrow opening in golden eagle skulls. The difference in the shape of this opening can also be seen in lateral view (Figure 2). These characters are usually present even if a partial skull (lacking the beak) is being examined.

Sternum (Figure 4)

The sternum, or breastbone, of the bald eagle is elongate. When placed with the keel pointing upward (as shown upper photograph), its sides are parallel or slightly narrowing at the rear (caudal) end. The caudal margin is often rounded. In contrast, the golden eagle sternum is compact and broadens at the caudal end, which usually has a straight or concave margin. There are often—but not always—small holes, or fenestrae, at the corners of golden eagle sterna. These holes are never seen in bald eagle breastbones. The keel of the bald eagle is also narrower than that of the golden, and it has a less robust caudal connection with the broad plate of the sternum, as shown in the lower photograph.

Pelvis (Figure 5)

The pelvis, or synsacrum, of bald and golden eagles differs in the shape of the iliac crest. This crest forms a smooth curve in bald eagles and has an angled, flared shape in golden eagles. The flat ridge along the top of the pelvis also differs, although this is less consistent. On bald eagles, this ridge tends to be broader and more uniform; on golden eagles, it typically has a narrow "waist" toward the front (or cranial) end. This may be a useful confirmatory character in combination with the shape of the iliac crest, but it should not be relied upon alone.

Coracoid (Figure 6)

The coracoids connect the sternum to the humeri. They are compact, sturdy bones that often survive intact

in scavenged or otherwise damaged remains. At the distal end of the coracoid, where the bone articulates with the humerus, is a broad opening, the semilunar notch. The distal head of the coracoid, above this notch, differs in the eagle species. In bald eagles, there is a smooth transition between the shaft of the coracoid and the distal head. Golden eagles, in contrast, have a raised "mushroom cap" of bone on the distal head, with a distinct lip along its lower margin. To see this character, it is important to orient the bone as illustrated. For the coracoid and all other paired bones, the right-side element is illustrated.

Humerus (Figure 7)

The humerus is the upper wing bone. Bald and golden eagle humeri differ in many characters, but the most easily assessed is the shape of the hollow, or pneumatic fossa, in the large proximal head. This hollow is large and round in bald eagles and smaller and more pointed in golden eagles.

Ulna (Figure 8)

The ulna is the large bone of the lower wing. The identification of eagle ulnae can be challenging; therefore, eagle species identifications should not be based on the ulnae alone if other bones are available for examination. They are included here because the ulnas are the bones that are most often used to construct Native American–style bone flutes, so they are regularly seen in wildlife crime investigations.

The shape of the curved ridge on the distal head differs between the two eagle species. In the bald eagle, this head is clearly rounded and almost C shaped. In the golden eagle, it is elongated and D shaped. This difference is most obvious when viewing the upper surface of the bone. Examination of the bony knob, or internal condyle, on the undersurface of the distal head may also be helpful. In the bald eagle, this knob appears quite centered inside the circular ridge. In the golden eagle, the bony knob is clearly offset relative to the D-shaped ridge. When assessing this character, it is important to look straight down on the knob, as the angle of view can alter the appearance.

Tibiotarsus (Figure 9)

The tibiotarsus is the middle leg bone, below the femur (which lacks clear species-diagnostic characters) and above the tarsometatarsus. When the bone is oriented with the partially fused fibula on top, the lateral crest is a long slender curve in bald eagles and broader, with a curved profile in golden eagles.

Tarsometatarsus (Figure 10)

This lower leg bone exhibits an easily assessed and diagnostic character differentiating the two eagle species. Look straight down on the top of the proximal head of the tarsometatarsus. The lateral margin has an obvious deep notch in golden eagles. There is no such notch in bald eagles; the lateral margin of their tarsometatarsi is smooth. If tarsometatarsi are present in eagle skeletal remains, they should always be examined, as these bones alone can provide reliable species identification.

In summary, if an intact skull or tarsometatarsi are present in eagle skeletal remains, species identification should be straightforward and unequivocal. Even when those bones are lacking, the annotated photographs presented here enabled untrained volunteers to identify eagle bones correctly $\geq$95% of the time for the pelvis, sternum, coracoids, humerus, and tibiotarsus. Identification of ulnas was slightly less reliable, but these bones were still correctly identified in 93% of examinations. When substantially complete eagle skeletal remains are recovered in avian mortality surveys or as evidence in wildlife crime investigations, characters summarized in this paper should allow definitive identification in almost all circumstances. Wildlife biologists and enforcement officers who may encounter eagle remains are encouraged to carry printouts of the figures in this paper as reference materials to assist in identification in the field.

Supplemental Material

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Table S1. Measurements, in millimeters, of total lengths of the bones of large raptor species in the collection of the National Fish and Wildlife Forensics Laboratory (NFWFL). Means and range of lengths were calculated for each species sampled. Species are identified by their four-letter alpha codes (Pyle and DeSante 2016). Abbreviations: F = female; M = male; unk = unknown sex; NP = bone not present for that specimen; BRN = bone broken for that specimen.

Found at DOI: http://dx.doi.org/10.3996/042017-JFWM-035.S1 (30 KB xlsx).

Reference S1. [BGEPA] Bald and Golden Eagle Protection Act of 1940, as amended April 30, 2004.

Found at DOI: http://dx.doi.org/10.3996/042017-JFWM-035.S2 (34 KB PDF); also available at https://www.fws.gov/le/USStatutes/BEPA.pdf (July 2017).

Reference S2. [MBTA] Migratory Bird Treaty Act of 1918, as amended. October 30, 1998.

Found at DOI: http://dx.doi.org/10.3996/042017-JFWM-035.S3 (53 KB PDF); also available at https://www.fws.gov/laws/lawsdigest/migtrea.html (July 2017).

Reference S3. Pyle P, DeSante D. 2016. Four-letter (English name) and six-letter (scientific name) alpha codes for 2127 bird species (and 98 non-species taxa) in accordance with the 57th AOU Supplement (2016), sorted taxonomically.

Found at DOI: http://dx.doi.org/10.3996/042017-JFWM-035.S4 (1639 KB PDF); also available at http://www.birdpop.org/docs/misc/Alpha_codes_tax.pdf (July 2017).

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Found at DOI: http://dx.doi.org/10.3996/042017-JFWM-035.S5 (3740 KB PDF); also available at http://www.fws.gov/lab/idnotes/EagleID_fromScans_final_small.pdf (July 2017).

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Found at DOI: http://dx.doi.org/10.3996/042017-JFWM-035.S6 (3637 KB PDF); also available at https://www.fws.gov/migratorybirds/pdf/management/EagleRuleRevisions-StatusReport.pdf (July 2017).

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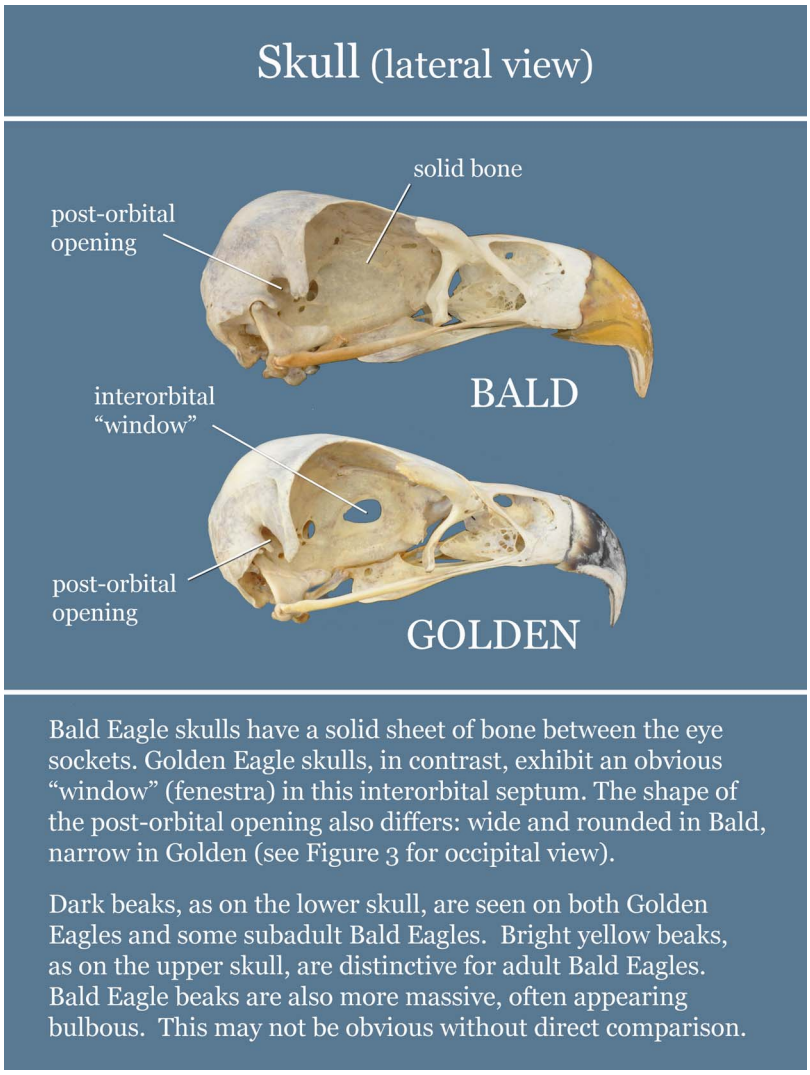

Figure 2. Skulls of bald eagle *Haliaeetus leucocephalus* and golden eagle *Aquila chrysaetos* (lateral view), with diagnostic characters noted. Photographs and measurements were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

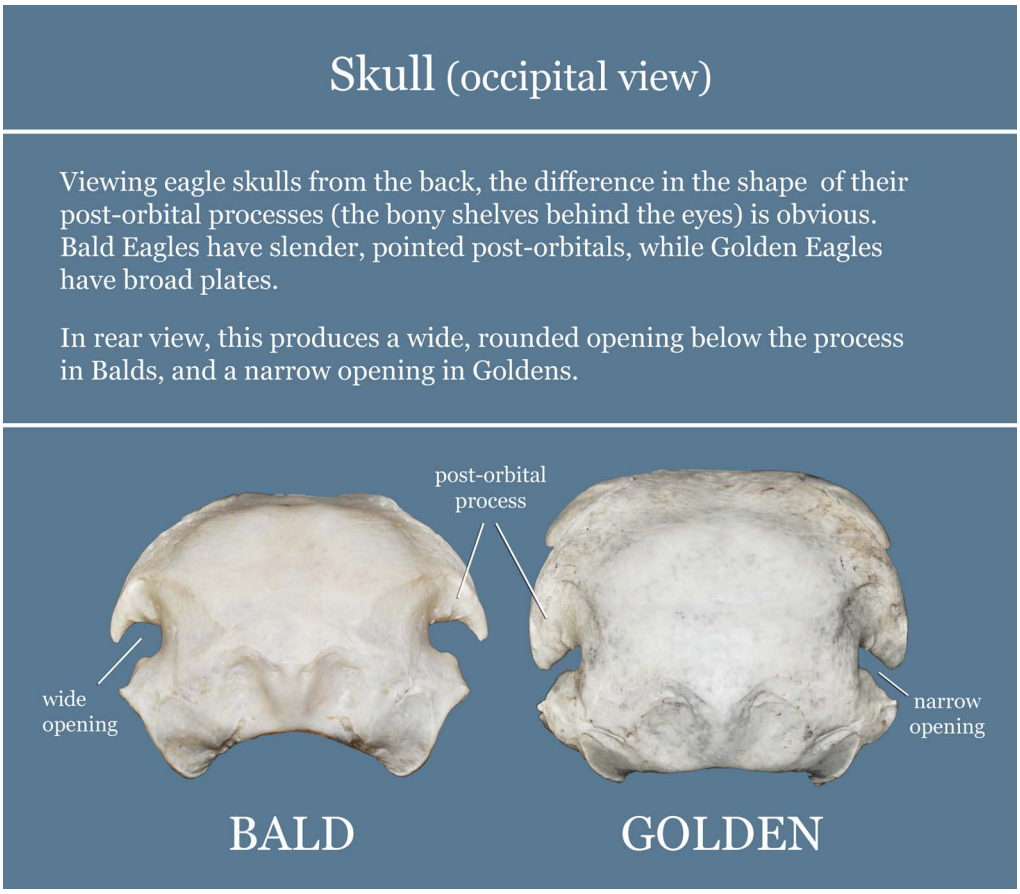

Figure 3. Skulls of bald eagle *Haliaeetus leucocephalus* and golden eagle *Aquila chrysaetos* (occipital view), with diagnostic characters noted. Photographs and measurements were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

Figure 4. Sterna of bald eagle *Haliaeetus leucocephalus* and golden eagle *Aquila chrysaetos*, with diagnostic characters noted. Photographs and measurements were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

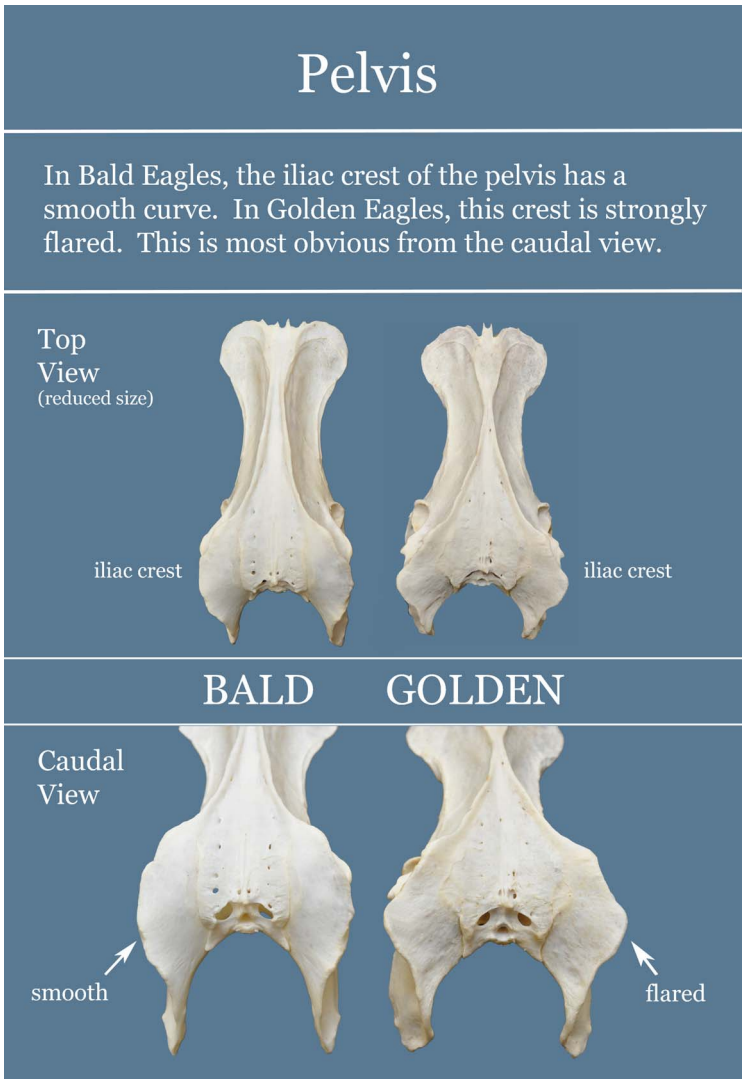

Figure 5. Pelves of bald eagle *Haliaeetus leucocephalus* and golden eagle *Aquila chrysaetos*, with diagnostic characters noted. Photographs and measurements were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

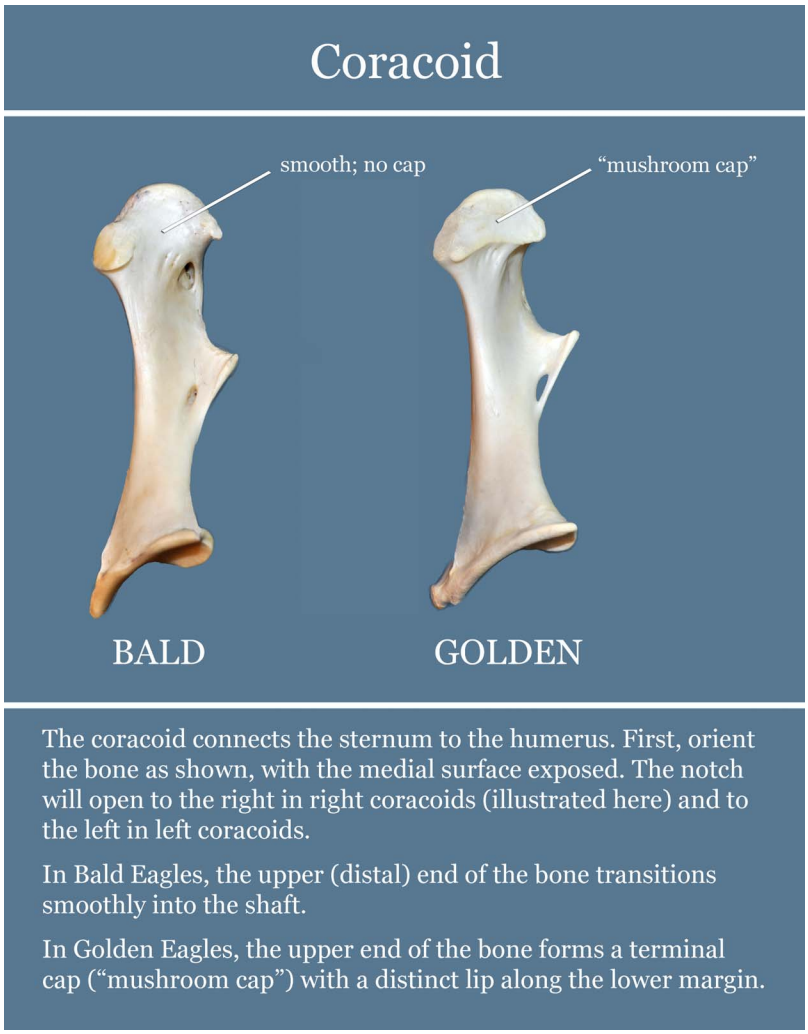

Figure 6. Right coracoids of bald eagle *Haliaeetus leucocephalus* and golden eagle *Aquila chrysaetos*, with diagnostic characters noted. Photographs and measurements were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

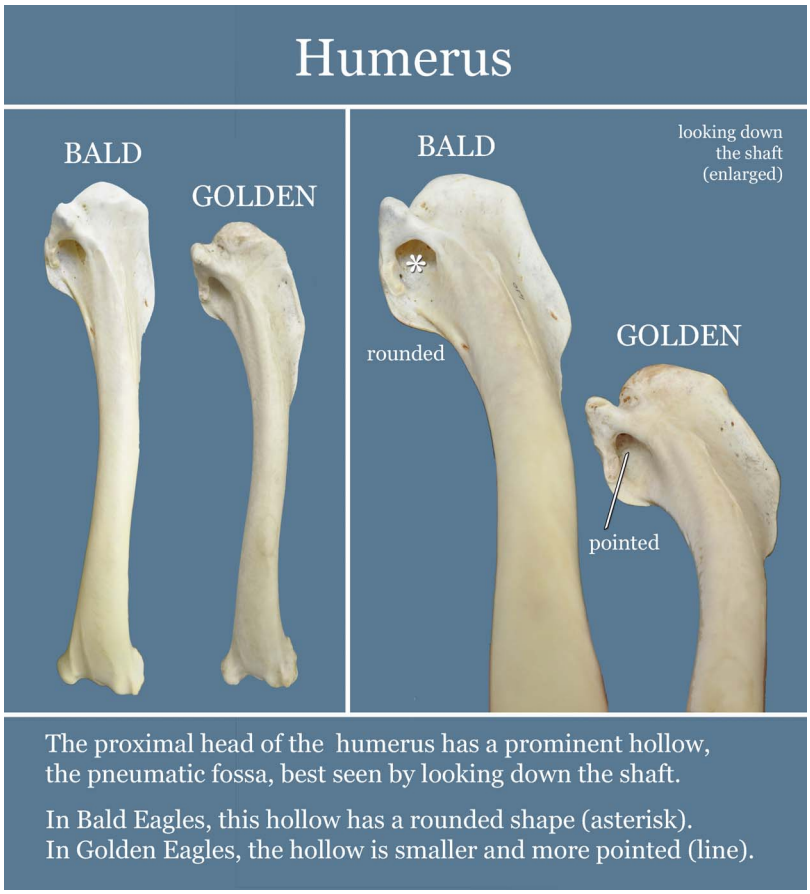

Figure 7. Right humeri of bald eagle *Haliaeetus leucocephalus* and golden eagle *Aquila chrysaetos*, with diagnostic characters noted. Photographs and measurements were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

Figure 8. Right ulnae of bald eagle *Haliaeetus leucocephalus* and golden eagle *Aquila chrysaetos*, with diagnostic characters noted. Photographs and measurements were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

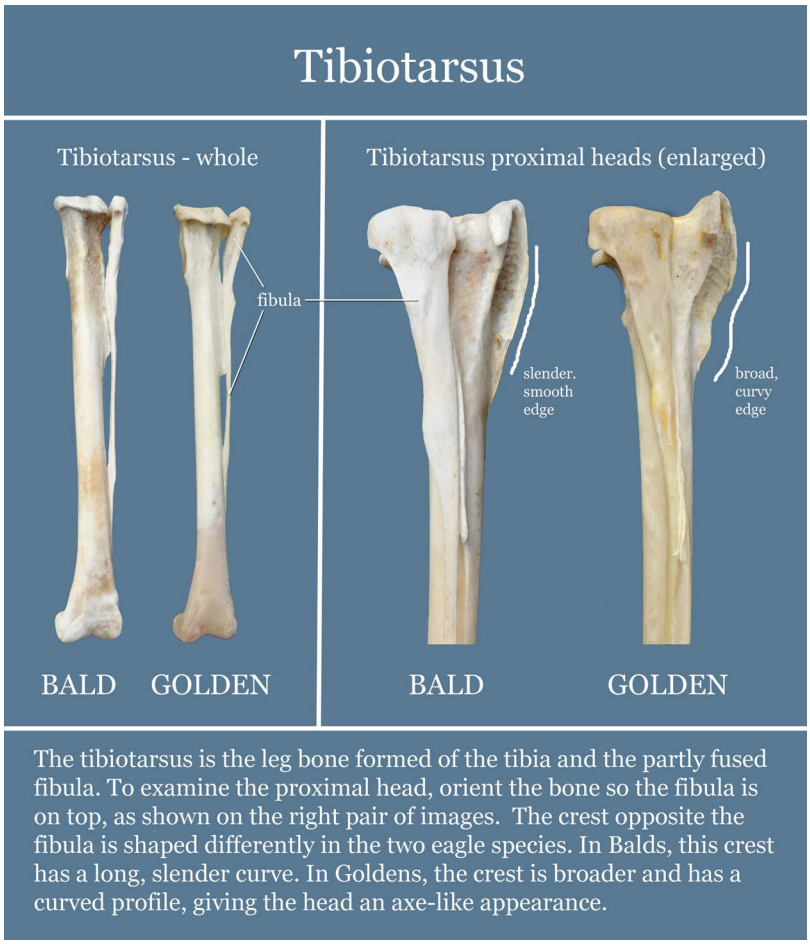

Figure 9. Right tibiotarsi of bald eagle *Haliaeetus leucocephalus* and golden eagle *Aquila chrysaetos*, with diagnostic characters noted. Photographs and measurements were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.

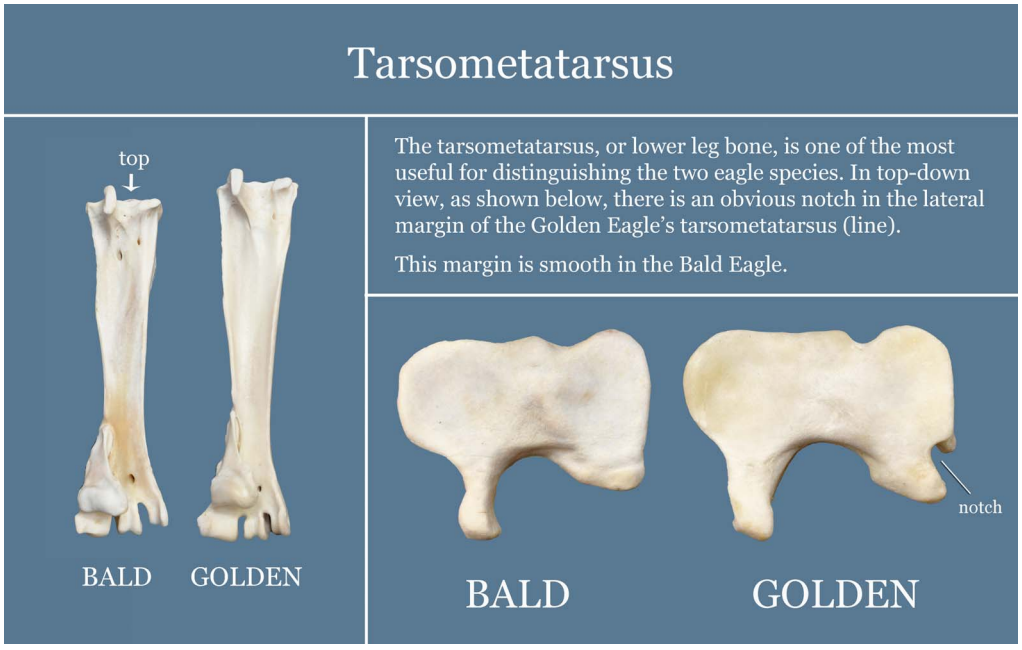

Figure 10. Right tarsometatarsi of bald eagle *Haliaeetus leucocephalus* and golden eagle *Aquila chrysaetos*, with diagnostic characters noted. Photographs and measurements were taken in 2016 and 2017 at the National Fish and Wildlife Forensics Laboratory, Ashland, Oregon.