



Arizona's Raptor Experience, LLC

August 2018

~Newsletter~

Greetings from Chino Valley!

We hope you're doing well and enjoying all the rain! I understand that this is the second wettest monsoon season since about 1990.

With all this rain comes many things. Relief for the wild animals who struggled through the drought, growing plants and blooming flowers to name a few.

In our yard the weeds have come on strong and we even have some mosquitos! I'm not complaining...

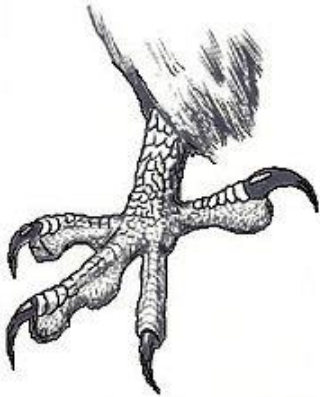
I am happy to report that the hummingbirds are here in droves and Paul's bees are doing really well and producing honey for the winter.

In this issue of our newsletter our focus is on raptor feet. We hope you enjoy it!



Our friend Nancy's new falconry bird, Karma. A juvenile Red-tailed Hawk.

Neat Feet...



The foot of a raptor is one of the defining features of the bird. The legs and feet together serve several important functions including supporting the weight of the body, cushioning the impact when landing, regulating body temperature, preening, defense and of course catching, holding and killing prey. Just as the feathers and wings of a raptor are finely tuned for their lifestyle, the feet are too just as adapted for each species.

The leg and foot of a raptor are mostly made up of bones and tendons. Blood vessels are found just under the skin as to not interfere with the activity of the tendons. The tendons run down the legs and through the feet to the end of each toe. Muscles in the legs control these tendons and when they contract, the foot closes tightly. The tendons slide into grooves on the underside of the toe and are held in place by fine ridges that engage with the rough ridges of the tendons to form a ratchet like mechanism. This serves two main purposes. It allows the bird to “lock on” a branch at night to sleep and to also hold onto prey without requiring much muscular effort to maintain its grip.

As mentioned, in addition to catching and holding prey, the feet of a raptor aid in temperature regulation of the body. The arteries and veins run next to each other. Warm blood in the arteries heats the cool blood in the veins as it returns to the heart preventing some heat loss in cold environments. Because the vessels are near the skin surface, heat can be dissipated when the arteries dilate when the bird is active or in hot environments.

Externally, the physical proportions of each species feet varies depending on the type of prey they normally pursue. Bird specialists tend to have very long toes with pronounced grips on the undersides aiding them when catching birds on the wing (in the air). Those species hunting primarily mammals tend to have shorter, stronger toes.

Cool Fact:

The Secretary Bird, found in Africa, inhabits primarily open grasslands and savannah. Unlike most raptors, they hunt on foot. They are equipped with very long legs and small feet that enable them to catch a variety of prey, including venomous snakes.

Other differences include toe position. Most raptors (and birds) have three toes facing forward and one toe in the back. Only owls and Osprey can reverse the direction of their outer toes, resulting in two toes facing forward and two toes facing back. This arrangement is referred to as zygodactyl. Benefits include greater ability to capture and hold prey and greater ability for Osprey and fish eating owls to hold slippery fish. The scales on the bottom of the feet (spicules) of fish eating raptors are modified into pointed spicules that are an extreme of the normal shape.



This preserved specimen illustrates the pointed spicules on the bottom of an Osprey foot.

While the talons on the feet of raptors are made up of the protein keratin, they too differ among species. For example, the talons of an Osprey are sharply curved when compared to other raptors. This design aids in holding fish. In Barn Owls, the talon on the central toe has a finely serrated inner edge which is used when preening the feathers.

Barn Owls also have relatively long legs for hunting in open grasslands, but sparse feathering on the legs and feet. Owls with heavy feathering to the tips of their toes often inhabit colder climates, and feathering also aids in silent flight. Diurnal birds with feathered legs are referred to as having “booted tarsi.” This includes many terrestrial eagle species and a few hawks. Feathers may serve to protect the legs.

Serrated edge of the central toe talon of a Barn Owl.



A Tale of Two Fishers: Nothing Fishy Going on Here

Piscivorous birds like pelicans (whose beak can hold more than its belly can), mergansers, herons, cormorants, gannets and puffins hunt and eat fish for a living. Can you name the two North American raptors that also share a fish-rich diet? You knew the answer already: The Osprey and the Bald Eagle.

Strictly speaking, a bird's occupation is defined by its beak and feet. In the case of Osprey, aka fish hawk (technically not a hawk at all), and Bald Eagles, the heavily curved talons (toenails) and armored toes that are perfectly designed for snatching and holding slippery, thickly scaled fish (think carp, suckers and drum).



Underside of a preserved Osprey foot.

The bottom of a raptor's foot is covered with 100's of tiny projections called spicules (equivalent to about 60 to 100 grit sandpaper) that probably aid it in dealing with motile, active prey such as snakes, lizards, crayfish, frogs and other slick-when-wet quarry. Consequently, the spicules are more pronounced in large aquatic raptors. Few of us get the chance to closely inspect the Osprey's or Bald Eagle's feet so let's take a look shall we?

Compare a Bald Eagle's talons to those of falcons and hawks and the heavy curvature is obvious, the sheer size and grip strength is enormous. Compare the eagle's foot to the Osprey's and the anatomy goes further. The Osprey possesses a reversible outer toe and the soles of all its toes are armed with sharp spicules, while the reversible outer toe is used for carrying its piscine payload.

Both raptors inhabit rivers, bays, lakes, swamps and reservoirs, their bare or exposed tarsi (legs) are a perfect adaptation for wading and hunting in icy waters and that might otherwise freeze. Ever try moving in frozen pants? The feathered or 'booted' legs of terrestrial raptors such as Golden Eagles and their inland-hunting relatives wear built-in legwarmers for heat retention.

Cool Fact:

Have you wondered why birds possess four toes instead of five? The next time this question is asked at a party you can wisely answer, "All birds *do* have five toes. The leg or tarsal bone you exclaim, is the fifth toe! The joint in the middle of the leg is the *ankle*."



These two images illustrate the size of a Bald Eagle's foot. The spread is about the size of an adult human hand.



Here calipers are used to measure the hallux talon on a male Bald Eagle. This measurement can be useful in determining the bird's sex.

Whose Feet?

Can you properly label the following six feet? (Answers provided at the end)

- a. Barn Owl
- b. Osprey
- c. Peregrine Falcon

- d. Ferruginous Hawk
- e. Great-horned Owl
- f. Screech Owl



1. _____

2. _____



3. _____

4. _____



5. _____



6. _____

*Fall hawk migration
will begin soon!
Keep your eyes to
the sky...*



Answer key:

- 1. C - Peregrine Falcon
- 2. E- Great-horned Owl
- 3. F- Screech Owl

- 4. B - Osprey
- 5. D- Ferruginous Hawk
- 6. A - Barn Owl