

# RAPTOR REPORT

## FOLKLORE EDUCATIONAL MESSAGES

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*All photos courtesy of Cascades Raptor Center*

Folklore husbandry is a developing term coined by Kevin Arbuckle used to describe the occurrence of handed down, unevicenced methods for caring for animals. Arbuckle encourages all individuals who are caring for animals to not simply partake in and pass on a particular method of husbandry because they were told it worked but instead, these caretakers should contribute to an evidence-based approach in animal husbandry to increase animal welfare.

Similarly, many of the educational messages that are shared with the public in both informal or formal demonstrations and shows are passed down from one presenter to another by word of mouth with little or no research to determine if the educational messages are up to date with the current scientific research. This method of passing along incorrect or half-truth information is continuing as new presenters mimic their mentors as they learn their show lines. As with the goal to improve animal husbandry to increase welfare, we should improve our show information by gathering the latest from scientific literature rather than parroting information that may have been handed down for decades from one presenter to another.

In this article, I will discuss several raptor-related educational messages that are half-truths to incorrect information that I have overheard in more than one raptor presentation. In doing so, I hope to encourage others to fact check the information that has been passed down to them and begin to weed out folklore educational messages from our shows and demonstrations.

### OWL EYE COLOR & HUNTING ACTIVITY

Many people believe that the color of an owl's eyes gives you information regarding when that owl hunts (diurnal, seminocturnal, or nocturnal). This folklore would have people believe that owls with light colored eyes hunt during the day or are seminocturnal. This tendency holds true in some cases. The Northern Pygmy Owl (*Glaucidium gnoma*) is a diurnal owl and does have yellow irises. How-



*The diurnal Northern Pygmy Owl (*Glaucidium gnoma*) has very large eyes.*

ever, one nest study had a recorded food delivery call at 22:00 hours which would have been significantly after sunset. Folklore would have you think that dark-eyed owls are strictly nocturnal and don't hunt during the day. However, the Barred Owl (*Strix varia*) who have dark brown irises have been observed by several researchers to hunt during the day. This daytime hunting seems to be strongest for male Barred Owls who will deliver prey items to the female at the nest cavity during the day in the breeding season. Similarly, the Barn Owl (*Tyto alba*) - while dark-eyed and primarily nocturnal - does hunt during the day in areas where competition for food is heavy and/or areas where daytime predation pressure is low.

While neat and tidy packages of information are easy to remember (dark-eyed equals strictly nocturnal; light-eyes diurnal or seminocturnal), they lead us down the path of overgeneralizations and misinformation. It would be better to learn specific natural history information for each species that you are presenting to the public. Regular updates are made to publications such as the American Ornithological Society and Cornell Lab of Ornithology's *Birds of the World* monographs which can give the presenter up to date research data.

### OWLS FLY SILENTLY DUE TO LEADING EDGE COMB

First, owl flight is not 100% silent as it can be heard behind the bird. Whether it is the stealth hypothesis or the self-masking hypothesis that drove the evolution of silent owl flight, neither the owl's prey nor their own ears are behind



The three traits paradigm of silent owl flight: leading edge comb, soft velvet dorsal on wing feathers, and vane fridges.

their bodies. In general, most owl species can move through the air with very little sound evidence. Folklore would have you believe that the leading edge of the owls' primary feather 10 (P10), which has a pronounced fringed, is responsible for the silent flight. Moreover, some species of owls have leading edge fringes on P9-P6. However, removal of this P10 fringe (and the subsequent fringes) in scientific research has demonstrated that it is not responsible for the silent flight and in some cases the removal doesn't significantly make the flight more audible.

Several other structural features of the owls' feathers assist in silent flight; the velvety dorsal surface texture of the flight feathers and the vane fridges also play a role in the noise reduction in owl flight. These three features (leading edge fringe, velvet surface and vane fringe) are known as the three traits paradigm of silent owl flight. However, additional research has added increased air transmissibility and reduced structural stiffness as possible contributing factors for the nearly silent owl flight. It would be more correct to state that several structural features in owl feathers reduce friction substantially when the owl's feathers move against each other or when they contact a stationary object. This reduced friction results in reduced structural noise, and hence, in nearly silent flight.

Many raptors such as this Golden Eagle (*Aquila chrysaetos*) have proportionally larger eyes than other flying birds.



While the leading edge comb of the Great Horned Owl (*Bubo virginianus*) P10 feather is prominent, if removed the owl is still able to fly silently.

## A RED-TAILED HAWK CAN READ A NEWSPAPER ACROSS A FOOTBALL FIELD

Aside from the fact that no raptors can read, this is a difficult concept for most audience members to relate to and so they assume the presenter is saying that a diurnal raptor's eyes are like a pair of binoculars and are magnifying the image - which is incorrect. Instead, diurnal raptors have very high spatial resolution. This concept may be better explained to the public as the raptor is seeing a higher resolution picture (with more pixels) than what a human eye can see.

The diurnal raptor eye (in addition to owls) is larger in both absolute and relative terms than other flying avian species. And predatory raptors (e.g., Golden eagles, *Aquila chrysaetos*) have larger eyes than scavenging species (e.g., Palm-nut Vultures, *Gypohierax angolensis*). Diurnal raptors have a high density of cones (light gathering cells) in their retinas. It is considered that these diurnal hunters have as many as one million cone photoreceptors per square millimeter (more than five times that of the human eye). Some pursuit hunting raptors also have two locations on the retina (the fovea) where the concentration of the cones is higher (humans only have one fovea). Additionally, diurnal raptors have four types of cones (red, green,

In comparison to other raptors, the scavenging Turkey Vulture (*Cathartes aura*) has proportionally smaller eyes.





In proportion to its skull, the Northern Saw-whet Owl (*Aegolius acadicus*) has one of the largest ear openings in the animal world.

blue and UV) giving them the capacity to see more colors than humans do and to distinguish things such as brown grass from brown mouse fur from afar. This fine discrimination of details (i.e., more pixels and more colors) is what defines the “eagle eye.”

## ALL OWLS HAVE ASYMMETRICAL EARS

Hearing is acute in some owl species and many species have physical modifications such as a feathered facial disc and asymmetrical ears which assist with hearing. While it is easier to observe that not all owls have exaggerated facial disks (e.g., *Scotopelia* genus), folklore would have us believe that all owls have asymmetrical ears.

The Barn Owl (*Tyto alba*) which does have asymmetrical ears has been one of the most researched species of owl when it has come to avian hearing. And, like some other owl species, the right ear is more sensitive to sounds coming from above the owl's face while the left ear is more sensitive to sounds coming from below the owl. Interaural differences (timing and

level) allows Barn Owls to calculate the location of prey based wholly on auditory cues alone. But what is true for Barn Owls doesn't always apply to all owls.

Not all strigid owls have asymmetrically located ears and none of them have been studied as much as Barn Owls regarding hearing. Great Horned Owls (*Bubo virginianus*) and Western Screech Owls (*Megascops kennicottii*) both have symmetrical ears openings and sound discrimination studies have shown that species with symmetrical ears do not hear as well as owl species with asymmetrical ears. These species rely more on sight than hearing for prey location.

For those species that have asymmetrical ears, there are significant differences between the anatomy of those ears. In some cases, the asymmetry is due to structural differences in the skull (e.g., *Aegolius* spp) and in other cases it is due to the fleshy structure around the ear (e.g., *Tyto* spp). There are also varying size differences between the ear openings themselves. For example, the Long-eared Owl (*Asio otis*) has ear openings that start near the lower jaw and end near the top of the head. The differences in morphology related to ear asymmetry would lead scientists to believe that owl ear asymmetry has arisen at least four different times throughout evolutionary history.

## CONCLUSIONS

This is only a small number of topics which you, as a raptor presenter, may (or may not) share as truth when it is really folklore (or something approaching the truth). There are many more tidbits that we share with the public that might not be true. I encourage you think carefully about

where certain “facts” came to you from and if you should do some research and check them for accuracy. For example, the old adage that “birds mate for life” is coming under a lot of scrutiny as molecular genetic techniques become more widely available to researchers. Many people share information on the grip strength of raptor feet. Two hundred pounds per square inch (PSI) for Northern Goshawks (*Accipiter gentilis*) is the grip strength I have been told, but where is that data to double check? We owe it to the birds we care for to have the most up to date natural history information available and we owe it the audiences to present them with accurate, scientific information.

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