

We would like to welcome **Dr. Dave McRuer**, Director of Veterinary Services at the Wildlife Center of Virginia to WVEC's EagleCam Moderated Blog. Please limit posts to question for Dr. Dave at this time. He will try to answer as many as possible after he completes previously submitted questions. Thank you!!!

Tuesday, March 8th, 11:00am

Dr. Dave McRuer: My name is Dr. Dave McRuer and I am the Director of Wildlife Services at the Wildlife Center of Virginia; a not-for-profit wildlife teaching hospital located in Waynesboro, VA. The WCV has been around for 28 years and we treat all injured species native to Virginia (except venomous snakes). Each year we admit approximately 2300 patients. Today I will try and address some of the questions submitted on the eagle blog over the last few days. I will concentrate first on Golden Eagles and then branch off to Bald Eagles, reproduction, and answer new questions if there is time.

Question 1: What are the major differences between golden and Bald Eagles beside their appearance? [Lighttower]

Answer: There are many differences between these two species. Although we call them both eagles, Bald Eagles belong to a larger group known as “sea eagles” (genus *Haliaeetus*) of which there are eight other species: Stellar’s Sea Eagles, White-tailed eagles, African Fish-eagle, Sandord’s Sea-eagle, Pallas’s Fish-eagle, Madagascar Fish-eagle, White-bellied Sea-eagle, and North America’s only sea eagle, the Bald Eagle.

Golden Eagles belong to a group known as “True eagles” or “booted eagles” (genus *Aquila*) of which there are 17 species. The word “eagle” has loosely been used world wide to describe large birds of prey capable of hunting larger prey items. There are many other genera of eagles but these are mostly confined to Europe, Asia and Africa.

Besides appearance, Bald and Golden Eagles differ in their prey, global distribution, habitat, and likely a few other things. Bald Eagles may be found around anywhere in North America however they don’t typically tend to stray too far from bodies of water. Golden Eagles are found worldwide but prefer higher elevations as they tend to nest on cliffs.

Question 2: How large are Golden Eagles compared to Bald Eagles? [JellyCity]

Answer: Bald Eagles normally lay 2 eggs (1-3) that are non-glossy white with a rough texture, and are 71 x 54mm in size. Golden Eagles tend to lay 2 eggs per clutch (sometimes 1), are non-glossy white and are marked with brown blotches or spots although one egg is often plain white, and are 77x58mm in size.

Question 3: Making a list of things the average homeowner can do to help the eagles to put in my column for the Va. Pilots gracious living section. So far I have, limiting the use of fertilizer, mosquito control, lead shot and proper disposal of fishing line, got anything else? Thanks. [tgar]

Answer:

- Allow old growth natural vegetation to survive around waterways
- Proper use of rodenticides that do not promote the rodents from becoming a prey source thus leading to secondary toxicosis in birds of prey
- Limit the use of insecticides such as organophosphates and carbamates. We get several cases of these toxins each year in Bald Eagles.

Question 4: Do Bald Eagles and Golden Eagles ever mate with one another? [Susan K.]

Answer: Falconers have successfully crossed Golden Eagles with Russian Steppe Eagles and Golden Eagles with Harris Hawks. In the wild, there are documented cases of Golden x Imperial Eagle hybrids and Golden x Lesser Spotted eagle hybrids. I have found wild records of Bald Eagle x Stellar's Sea-eagle hybrids.

Question 5: What do Golden Eagles eat in the wild? What was your Golden Eagle fed while he was at your hospital? [Maxi]

Answer: In the wild, Golden Eagles mostly eat medium-sized animals such as hares, rabbits, game birds, and reptiles. Golden Eagles will also eat carrion if other live food sources are low and they have been known to predate lambs and small calves in the West. In captivity, we feed our Golden Eagles a variety of foods including mice, large rats, farmed rabbits, quail, fish, and goose meat.

I should add that the western population of Golden Eagles fluctuates based on the population of jackrabbits. Good years for jack rabbits are good years for eagles.

Question 6: Why couldn't you save the eagles toe? Was it gone already? [Guest]

Answer: The eagles toe was actually dead from halfway up the toe to the tip. The bone was openly exposed and nonviable. As you need live bone on both sides of a fracture to heal, repair was not possible for this bird. I have a photo of the toe before the amputation that I'll send along to be posted. Once you've seen it (warning: PG-13) you'll understand why we couldn't save the whole toe.

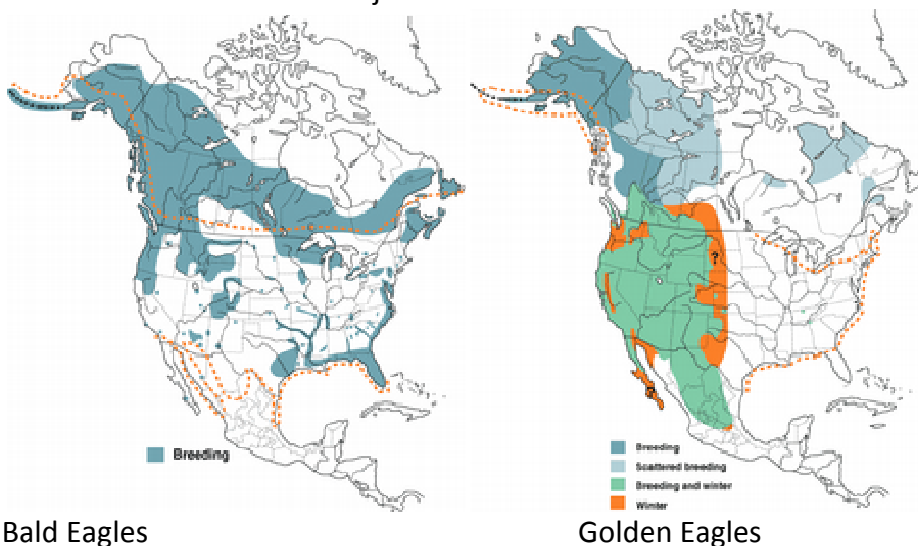


Question 7: How does the Golden Eagle population compare to the Eagle population? Also, what part of U.S. do they mostly live. [Annie]

Answer: Golden Eagles breed and live mostly in the west half of the North America although there is a small eastern population estimated at 2000 individuals. The number of Golden Eagles in North America is not known although estimates done in the 1970's suggest up to 100,000 individuals. In 1998, a study estimated between 2000 – 10,000 breeding pairs in Canada.

In North America, Bald Eagles breed throughout Canada except in the far North and Prairie Provinces, and along the Atlantic, Gulf, and Pacific coasts, up the Mississippi, around the great lakes, and near rivers throughout the Central and Western States. The North American population is thought to be increasing and the most recent population estimate is over 100,000 individuals with the largest number in Alaska and British Columbia.

The Birds of North America Online has some wonderful distribution maps if you'd like to see further resources on the subject.



Question 8: Do Golden Eagles mate for life also? Here in Co. yesterday I saw three Golden's soaring together, is this common? TY [Oliver]

Answer: It depends on where they breed. Golden Eagles nesting in temperate climates may occupy the territory year round and therefore establish a permanent pairing. Migratory eagles that nest in the North start new pair formations each year upon their return. New pairs form throughout the year soon after lost mates are replaced.

Question 9 : Can eagles lay eggs without a mate? [luvseagles]

Answer: Yes. Like many captive birds of prey, females will lay eggs despite the absence of the male. These eggs are infertile.

Question 10: Will the eagle you released stay in Virginia or go somewhere else? [jonathan]

Answer: Great question. Based on past studies on the eastern population of Golden Eagles, we suspect that this bird will migrate north to either the Gaspé peninsula in Quebec, northern Quebec, or into Labrador where it will establish a breeding territory. The bird we released was over 6 years old and is likely a prime breeding candidate. It seems that the eastern Golden Eagles winter throughout the Appalachians.

To see some great maps from a prior bird in the study by VDGIF, please see the following url:
<http://www.dgif.virginia.gov/wildlife/birds/golden-eagle/>

[To see updated maps of where the Golden Eagle is that the WCV released, please visit the "Golden Eagle Tracking" link on the front page of our website, www.wildlifecenter.org]

Question 11: Question for Dr. McRuer: So upsetting to hear of eagles getting injured in coyote traps. Are these against the law? If not, why not? Thanks. [Kathy from Louisiana]

Answer: No, leg-hold traps are still legal in most states although there are strict rules about where, how, and when they may be set. The person who was setting the traps that caught the eagles was doing so legally to prevent coyotes from attacking his chickens. He had a permit, the traps were set according to regulation, and when he realized that there was a bird caught in the trap, he immediately called the conservation police officer for assistance. When he caught a second bird a week later, he removed his traps according to orders from the CPO. These traps have their purposes and when used appropriately, are endorsed by the Wildlife Disease Association; a group of wildlife veterinarians, biologists, and wildlife managers. Sadly, no matter what kind of trap you are using or the reason you are setting them, "by-catch" is always an issue.

Question 12: Has your group studies accumulated any information to prove that latitude affects or extends eagle life expectancy. [Raptorman OH]

Answer: Our group has not assembled this information however a paper in 1999 by McIntyre and Adams reported that Golden Eagle populations in the northern end of their range have smaller broods and produce fewer fledglings than those in more temperate climates. They found that brood size was 12% lower in the north and population productivity (fledglings/occupied nest) was 25% lower in the north.

Question 13: Why do Golden Eagles have feathers on their legs and Bald Eagles don't? [Guest]

I'm sorry, I don't know the answer to this one. Warmth? I'd welcome comments from my biologist colleagues on this one.

On to some Bald Eagle questions:

Tuesday March 8, 2011 11:26 Dr. Dave McRuer

Question 14: I was wondering if you know how large the brood patch is on eagles, and is it an area that is free of feathers ? Thank you :-) [Connie (Va Beach)]

Answer: In eagles, both the male and the female develop brood patches although the female's patch is often more extensive. The area is mostly free of feathers and covers several inches on either side of the keel over the breast muscles.

Question 15: How big are eagles feet? [jane jane]

Answer: The footpad length of a female Golden Eagle is > 138.5mm. The footpad length of a male Golden Eagle is not measured when determining the gender of this species.

Question 16: Dr Dave - What is the most common injury do the raptors experience that are being brought into WCV for treatment? [Debbie]

Answer: The most common raptor injury on admission to WCV is trauma caused by vehicle impact. This occurs in all species. Luckily we've seen a decrease in pesticide and gunshot injuries over the years

Some Buddy questions:

Tuesday March 8, 2011 11:30 Dr. Dave McRuer

Question: Any chance of Buddy returning to the gardens one day? I bet they would get a large turnout! [tgar]

Answer: After Buddy has been trained and is comfortable on the glove, I'm sure there will be visits to the Gardens.

Questions 18-19: Is there any news on when the start date will be for the new pen for Buddy? [iml8agn] Dr Dave - When do you anticipate Buddy being ready for his first public appearance as an educational bird? [Debbie]

Answer: We have been reevaluating the style of Buddy's new enclosure based on feedback from a number of different raptor centers around the country. These changes must incorporate a design that both allows Buddy to stretch his wings and allows the trainer to continue working with him. We hope to announce more information on the enclosure in the coming months. While we all want Buddy to have a new enclosure, we want to make sure the specifications are perfect for everyone and that we're using the donated funds in the most responsible way possible. Last fall we made some modifications to Buddy's current home to make it easier for visitors to see him. He seems comfortable and content in his present enclosure

Recently we have some new perches made including a mailbox perch and an eagle sized bow-perch. These will be installed shortly.

Question 20: Do eagles catch cold? [starfish]

Answer: In people, a "cold" is usually defined by an infection with an influenza virus. As you likely know, there is an avian form known as avian influenza or avian flu. This disease has been a hot topic in veterinary and human medicine in the last several years as the highly pathogenic version can have deadly consequences to both animals and humans. High Path avian influenza has not been documented in North America although a low pathogenic strain is prevalent in many wild bird species including waterfowl and shorebirds. It is not unconceivable that eagles could become infected with this strain. In fact, we documented a low path strain of avian influenza at the Wildlife Center of Virginia two years ago in an eagle. There bird showed no clinical signs of infection.

Question 21: Can we see Buddy anytime and can you take him out for us to touch him? [amanda, age 8]

Answer: You are more than welcome to come to the Wildlife Center of Virginia and see Buddy during an Open House or on our annual Buddy Day. Sadly, touching Buddy like you would a pet dog or cat can be very stressful to wild animals despite the fact he now lives in captivity. For this reason, we don't allow people to touch our education animals.

[Comment From Debbie]

Dr Dave - Are there many Golden Eagles found in southeast Virginia?

Dr. Dave McRuer:

As Golden Eagles prefer higher elevations, most of the population is found in the Appalachians. That said these birds can travel quickly and there certainly have been sightings of Golden Eagles along the coast.

[Comment From Molly]

Dr. McRuer, Can you tell us anything about the Golden Eagle at Wm. Busch Gardens. How did it get there, age, etc.

Dr. Dave McRuer:

I'm sorry, I don't know much about that bird. I'm guessing it is either a captive bred bird or was originally from the West.

[Comment From Roanoke:]

do Golden Eagles attack humans

Dr. Dave McRuer:

Perhaps if they're wearing a jack rabbit on their head. These are extremely powerful birds and if they are cornered, they can cause a lot of damage with their talon. However like most wild animals, they prefer to get as far away from humans as possible.

[Comment From maudie]

approximately how many Golden Eagles are there in captivity and compared to how many Bald Eagles are in captivity

Dr. Dave McRuer:

I'm sorry, I don't know the answer to this question.

[Comment From Lawrence]

Is it against the law to keep a Golden Eagle in captivity, or to possess any things such as feathers, etc?

Golden Eagles are protected under the Migratory Bird Act and the Bald and Golden Eagle Act. Possessing a live animal or any part thereof is against the law and many people have been prosecuted for violating these rules. Registered falconers may apply for a permit to have a live Golden Eagle however the rules are becoming harder to take one from the wild and so most birds are acquired through captive breeding programs.

[Comment From Susanne (from Germany)]

Are the Golden Eagles the exact same species / subspecies as the Golden Eagle in the Alps ? Which subspecies is most endangered?

Dr. Dave McRuer:

My wikipedia skills tell me there are 6 subspecies of Golden Eagle worldwide and only one subspecies in Eurasia (except the Iberian peninsula) I'm not sure if any of these subspecies are endangered.

[Comment From Molly:]

How did the Golden just released tolerate humans? Thank you

Dr. Dave McRuer:

At first, the eagle did not care. That's because the bird had lost so much blood that it was in shock for several days. Once the red-blood cells had regenerated, the blood pressure restored and the bird had been given food and pain meds, it was a mean golden fighting machine and wanted nothing to do with us.

[Comment From Raptor man Ohio]

Dr. Dave, On a hunting trip to Wyoming, I observed a pair of Golden Eagles harassing a flock of sheep. They singled an animal out and dive bombed it until it succumbed. I lost a bet on this. Is this atypical behavior for goldens, or an isolated event by an innovative pair?

Dr. Dave McRuer:

I've heard similar stories of eagles (especially in the winter) hunting in groups in order to bring down larger prey. Have you seen the footage of the Golden Eagles in Europe bringing down wild sheep? Real or scam?

[Comment From Guest :]

Do Golden Eagles and Bald Eagles ever share a territory?

Dr. Dave McRuer:

For the most part, these eagles nest in different locations and hunt different prey. There is lots of footage being collected at the present time by a biologist in West Virginia of both bald and

Golden Eagles scavenging on deer carcasses. Winter territories certainly overlap. In the breed season I'm guessing that territories may overlap in the west and in BC and Alaska but I'm not sure if this presents a problem. My guess is no.

Congowings:

Dr. Dave - I know your time is limited. I think you should post the questions previously submitted at this time. Perhaps you can come back at another time and answer more questions.

Dr. Dave McRuer:

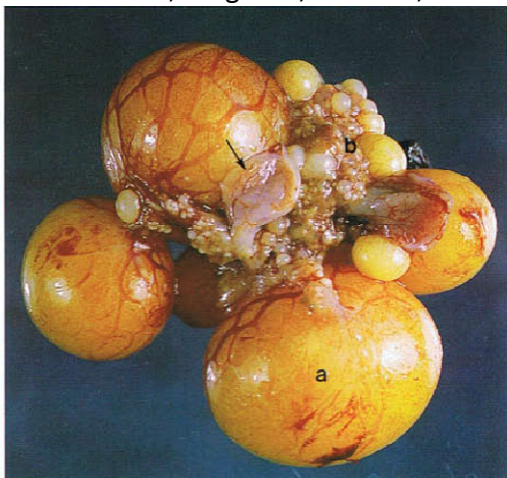
I've gone through all my Bald and Golden Eagle question so let's finish with a little reproduction

Questions: If there is no penetration during mating, how does the sperm get to the ova? [Lighttower] Is the time of fertilization dependent on the male or females system, seeing as they 'enjoy' each others company without reproducing? [sheri] Would you know anything about the development in the egg, such as when does the little heart start beating? [Susanne (Germany)]

Answers: I'll try to answer this series of questions at once. First, a caveat: Most of the physiological information on avian embryo development and reproduction comes from studies in domestic birds such as chickens and geese. It is assumed that many of the same reproductive mechanisms occur in most wild bird species. That said, biology is riddled with exceptions.

Dr. Dave McRuer:

Okay, let's first start with anatomy: In most bird species only the left ovary is functional and only rudiments of the right persist. This differs in birds of prey where two fully developed ovaries are seen. Surrounding the ovary is the oviduct which in birds is composed of 5 parts; the infundibulum, magnum, isthmus, uterus (shell gland) and vagina.



Infundibulum: There are two components, a funnel and a tubular region. The oocyte or egg leaves the ovary and penetrates the funnel region of the oviduct before it is covered with albumen (the egg “white”).

Magnum: This is the longest and most coiled part of the oviduct. Here, secretion from the glands forms the bulk of the egg-white protein (albumen); the magnum has a milky white color due to these secretions.

Isthmus: This region is very short in length. Here, glands possess sulphur-containing proteins and produce shell membranes that surround the egg white.

Uterus: This is another short section and is where shell formation occurs and pigment is placed on the surface. The egg remains here for the greater part of its journey through the oviduct.

Vagina: This structure is fixed in a permanent S shape by smooth muscle and connective tissue. The egg passes through here on the way out.

Now on to bird sex:

Male eagles lack a penis. Instead, a sperm “package” is ejaculated from the male’s cloaca (common opening for sperm, urine, and feces) and enters the female’s cloaca when the two cloacas are pressed together during copulation. The volume of ejaculate is between 0.5-1 mls and the total number of sperm per ejaculate is $1-2 \times 10^9$ million.

Within minutes of insemination the sperm reach the top of the female’s oviduct, but within 24 hrs they disappear, only to reappear in the in the same location in small numbers at the time of each subsequent laying or ovulation. In chickens, females have a structure in the vagina called the “spermatic fossulae” where sperm resides, however it is not known how the sperm get in, how they survive, or what causes them to be released. Some sperm may also be stored in grooves and glands of the infundibulum; the top portion of the oviduct. One copulation may be all that’s needed to fertilize all eggs that year.

Before ovulation, many follicles grow on the bird’s ovary. In chickens, a mature primary oocyte grows from about 6 mm to about 40 mm in 6 days, weighs about 60 g, and takes up a ton of space! As a fun fact, the avian oocyte is the largest cell in the animal kingdom (chickens = 20g; there is an extinct Madagascan Elephant-bird whose oocyte had a diameter of 37 cm and volume of a bucket (don’t know what size of bucket)).

In chickens, four or five large follicles may develop on the ovary at the same time and may all reach about 40 mm in diameter. Many thousands of smaller follicles are also present. One follicle always wins and is released from the ovary during ovulation. Ovulation occurs (chickens) about half an hour after an egg is laid and the mechanism is either hormonal or nervous. The newly released oocyte is grasped and swallowed by the infundibulum. Oocytes that are not

caught are often absorbed within 24 hrs or can cause egg peritonitis; a condition where the body "sees" the follicle as a foreign presence and a massive inflammatory reaction may occur.

Fertilization occurs within the infundibulum less than 15 minutes after ovulation. Polyspermy, or when multiple sperm penetrate the egg at the same time, is very common. When this occurs, all the sperm divide initially but soon they stop and then degenerate probably due to chemical messages released by one dominant sperm.

A young bird's heart starts to beat around 72 hours after the start of incubation. At this time, the heart has only 2 chambers but will eventually divide into 4; two atria and two ventricles.

Dr. Dave McRuer:

And those were all the questions that I had for the group. Thanks to everyone who contributed questions and/or tuned into this chat. If you'd like to find out more information on the Golden Eagle that was released last month, please check out the "Golden Eagle Tracking" link on our website: <http://www.wildlifecenter.org/>. Happy viewing!