

National Arboretum Eagle Nest FAQs

How do you tell Mr. President and The First Lady apart?

This is our second season observing Mr. President and The First Lady so we are still learning about this pair but hopefully some of the things below will help you in identifying the adults. The First Lady is larger, her beak is a paler yellow, and she has lighter tipped feathers. She has two lighter spots on her back near her tail, her beak has a slight curve, and she has some indentations on the top of her beak. She has some dark feathers throughout on her head & neck, and also has a dark streak on the right side of her tail. Mr. President is the smaller of the two, is darker, and has a brighter yellow beak which appears to be straighter. He sometimes has a visible blaze of white feathers down his chest area. He has a dark spot near his left eye that is usually visible in profile. Sometimes it is hard to distinguish one from the other, depending on lighting and how they are sitting in the nest.

<https://www.flickr.com/photos/94664847@N07/albums/72157664614930711>

What is the light shining on the nest and why is my stream in black and white?

The light you see is an infrared light which the Eagles cannot see. To the eagles, the nest is dark at night. We've installed low power IR illumination devices that are 7-10 feet from the nest. They do not emit heat, dangerous radiation, or noise. A small chip inside the camera does the job of converting the IR image into visible light through tiny electric charges. Images coming from IR cams will be in monochrome since the chip does not detect color. Here's a link that may help to understand more about IR cams.

<https://www.flickr.com/photos/94664847@N07/15346063397/in/album-72157636759692955>

How do eagles mate/copulate and how often?

Mating happens by pressing cloaca together - This is also known as the 'cloacal kiss'. The female will lean forward, the male will land on her back. The female will move her tail feathers to one side, the male will press and twist his cloacal opening around her cloaca, passing the sperm from his cloaca to hers.

Generally, eagles may mate throughout the year depending on if the pair migrates. Frequent mating strengthens their bond to each other and increases the chance of fertile eggs, the female is only fertile about two weeks out of the year. The male's sperm is said to be viable inside the female for 10 days. Increasing daylight hours causes the females pituitary gland to secrete a hormone that turns on the ova. The ova is turned off by prolactin which is the hormone associated with incubation.

How soon after a successful copulation will eggs be laid?

It is believed that an egg is typically laid 5-10 days after successful copulation. Each egg is typically laid about 3-5 days apart.

How are the eggs fertilized?

The sperm travels up the oviduct (tube connecting to the ovary) to reach the ovum (the female reproductive cell, which is capable of developing, usually only after fertilization, a new individual) at the infundibulum (This is where the fertilization happens). The sperm fertilizes the ovum by penetrating the yolk, then the outer egg membrane seals off which prevents further sperm entry and the fertilized egg can now begin the 3-day journey down the oviduct. The yolk will provide food and nutrients for the developing chick, the white will keep the yolk from drying out and give it physical support. Membranes are formed around the yolk and egg white, and different layers of shell are added, and then the egg is laid. The shell is mostly made up of calcium carbonate - the same chemical formula as limestone - making it hard yet brittle. The process continues for each new egg that is laid every 3-5 days or so until the full clutch of 2 or 3 and rarely 4 eggs are laid.

How are eggs formed?

There is an average of 25 hours between ovulation and oviposition (laying) in chickens and the egg rotates slowly as it progresses. The yolk is deposited in rings while in the ovary. Once the

egg is released, fertilization occurs in the infundibulum (takes about 15 minutes to pass through). The egg next moves through the magnum over a 2-3 hour period. Here, the albumen is secreted in four layers: inner thick (chalaziferous), inner liquid, outer dense (albuminous sac), and outer liquid. The albumen is a water and protein source for the embryo and also cushions the embryo and deters infectious agents. During the next hour the egg moves through the isthmus (a narrow organ, passage, or piece of tissue connecting two larger parts), where two nonliving shell membranes are laid down to act as a matrix supporting shell formation. The shell membranes are composed of keratin-like fibers and pigment and act as a mechanical barrier to infection.

The longest part of egg formation takes place when the egg moves through the shell gland or uterus, which takes about 20-23 hours. Here is where the shell, pigment, and cuticle are laid down. The shell acts as physical protection for the embryo and is the primary source of calcium for the developing embryo. The shell also acts as the first barrier to infection. This is a mechanical barrier which is based upon pore size and length. The cuticle acts as a further mechanical barrier to infection by partially occluding the pores in the shell. Lastly, the egg passes through the vagina and cloaca before it is finally oviposited (laid).

Source: IWS

Assuming the egg(s) fertile, how long will the egg(s) be incubated?

The adult eagles will both incubate the egg(s), typically, hatching will occur after 35-38 days but we've observed hatching at 41 days of incubation.

What is incubation?

Incubation is the process of sitting upon (eggs) for the purpose of hatching and to maintain the eggs at a favorable temperature and in other conditions promoting development.

The eagle pair will sit on the egg(s) to bring them up to a certain temperature (94-105 degrees F) which will set development into motion, it may begin after the first egg is laid, meaning that in a nest with more than one egg there will be an oldest sibling, a younger sibling, and occasionally a middle sibling.

What is delayed incubation?

Development does not begin until the onset of incubation so a delay may serve and be caused by many different stimuli, though the reasons are not clear, it may relate to one of the following.

- Ambient temperatures at the time of laying.
- To synchronize the brood (hatching closer together) - normally eagles begin to incubate with the first egg laid which leads to asynchronous hatching (hatch days apart).
- Rapidly growing young are in the same stages of development.
- Less variation in size and ability between older and younger siblings (Rivalry).

Birds often start incubation slowly or gradually when temperatures aren't in the freezing range. Freshly laid eggs can spend a lot of time in the zone of suspended development (roughly 28.4 to 80.6°F or -2°C to 27°C) with no harm to the egg or embryo.

What happens during hatch?

As the embryo approaches its maximum size, the gas exchange capacity of the chorioallantois (membrane) becomes insufficient, resulting in the decrease in blood oxygen and increase in blood CO₂. These changes in the blood trigger hatching contractions. While positioning itself for hatching, the embryo consumes the remaining fluids.

The embryo's spine aligns with the long axis of the egg and its dorsal (back) side corresponding to the

"highest" edge of the air cell. The head is normally between the thighs in the small end of the egg initially, and then moves up along the side of the body to under the right wing. In this position the egg tooth is under the air cell.

Next, the hatching muscle engorges with lymph (Fluid), often causing the entire head to become edematous (swell) (pulmonary respiration will dissipate the edema). Correct positioning is correlated with incubation position (on side versus air cell up) and adequate ventilation (increased CO₂ can cause the embryo to orient upside down). The air cell begins “draw down” (seen during candling) as the inner and outer shell membranes separate. Instead of being taut, the inner membrane now drapes over the embryo and the air cell may have irregular margins. Internal pipping (breaking into the air cell) occurs as contractions of the hatching muscle cause the egg tooth to pierce the inner membrane.

Once into the air cell, pulmonary respiration begins and you may hear vocalizations, including response to external stimuli external . Muscle contractions subside as gas exchange improves and the embryo rests. The chorioallantoic vasculature (vascular membrane) begins to recede, starting around the air cell and finally at the umbilical seal just prior to hatching.

External pipping occurs as the hatching contractions resume in response to decreasing O₂ and increasing CO₂ and cause the egg tooth to pierce the shell. Contractions subside again as gas exchange improves and the embryo rests again . During embryonic movement the yolk sac is gradually drawn into the abdomen. By hatching the yolk sac has been fully internalized behind a tight umbilical seal with residual chorioallantoic vessels protruding , which quickly dry. The site of external pip is broken up as hatching contractions resume in response to decreasing O₂ and increasing CO₂. Again, the embryo rests. Rotation occurs with sustained hatching contractions combined with pushing by the legs. Rotation occurs in a counterclockwise direction (as viewed from air cell end) and can encompass ½ to 1+ times the circumference of the egg. Hatching occurs as the embryo pushes out of the shell and the chick rests and dries off.

Source - IWS

Do both parents share responsibilities?

Both parents share the duties, they will both participate in nest building, incubation, brooding eaglet(s), feedings, hunting, protecting the eaglet(s), and guarding their territory.

Where are the eaglets and why do the parents sit on them?

When the parents sit on them they don't actually put of their weight on the eaglets. This is called “brooding.” Eaglets cannot regulate their body temperature until they are about 2 weeks old so the parents cover them to keep them warm and dry. The parents will continue to try to keep them covered even when they are too big to fit underneath. The parents will even extend their wings to protect their eaglets from the rain.

How often are the eaglet(s) fed? Why is only one eating?

The eaglet will eat as often as food is offered. Oftentimes the parents feed them so much they can barely lift their heads. Eagles are very attentive parents and will care for both eaglets. It is very normal for the oldest eaglet to dominate when being fed. As the eaglets grow and become closer to the same size, it has been our experience that sometimes one eaglet will be more dominate, than perhaps the other one will. These birds grow quickly, putting on a half pound to a pound a week for the first 9 -- 10 weeks or so, depending on if it's a male or female.

How can you tell the sex of the eaglet(s)?

Visually, the all eaglets look almost identical, but as with most raptors, the female is larger (heavier and bigger) than the male.

How do the eaglets get water?

Hydration comes from the foods they consume, also known as metabolized water.

How much does an eaglet eat during a day?

An eaglet will eat as much as it can at a single feeding.

What is a crop and how is it used/are the eagles yawning?

A crop is a storage area below the chin that is filled with the food when some birds (not all) eat. When the eaglets have a full crop you will see it bulging out. Adult Bald Eagles can store up to two pounds of food in their crops. A crop is an extendable part in the esophagus that is used to store and soften food and controls the flow of food through the digestive tract. When you see what looks like a yawn, it is the bird moving food from the crop to the stomach. All indigestible materials like fur, feathers, bones, etc will be thrown up as a pellet.

What is a cast/pellet?

Eaglets and eagles of all ages cast pellets, when the birds are casting a pellet they can appear to be vomiting or choking. A pellet is prey parts that could not be digested (bits of feathers, fur, fish scales, etc.); these items are squeezed into a pellet in the bird's gizzard and then expelled through the mouth.

Why is the older eaglet picking on the younger one? Does the younger one get enough food?

Sibling rivalry in eagles can manifest in several ways. What you may see is pecking and bullying over food. It's hard to watch, but thankfully, this phase typically passes quickly and the behavior doesn't seem to be as harsh where food is abundant. The more dominant eaglet takes most of the food until it's full, then it sits back and lets the next eaglet get fed. Two-eaglet broods are common, and quite often both eaglets survive. Siblings will compete for food and parental attention, with one bird trying to out -- compete or dominate the other. The younger bird soon learns to lay low until the older has been satisfied. The younger will quickly learn to watch for opportunities to make grabs for food or reach around the larger bird to get food. This behavior occurs more within the first several weeks of life, declining as the siblings learn. You'll notice that sometimes they eat so much they fall asleep. Siblicide (one eaglet killing or causing the starvation of another) appears to be rare in Bald Eagles. Even with our decade of combined experiences, with Bald Eagle nests on cam and in person, both captive and wild, we've never seen an eaglet be pushed out of the nest by the older, more dominant sibling. We've never seen the smaller eaglet killed by the older eaglet. We aren't saying it isn't possible, just that we've never witnessed it in either our captive breeding nests or in the wild eagle nests where are cams are located.

What do the eagles eat?

Eagles are opportunistic feeders and will eat almost anything. But they prefer fish! Any kind of fish! We have seen catfish and perch. Also, they will eat waterfowl and small mammals such as squirrel and rabbit. In the 2016 nesting season we saw mink brought in, that was a first for many of us!

Where do the eagles get the fish?

There are two rivers here, the Anacostia and the Potomac, and more than likely the fish has been caught at one of these two locations.

Why do eagles eat the fish head first?

Most of the spines of fish are oriented backward so will only go down one way. Adults will feed on the hard parts and feed the softer tissues to the eaglets. Feeding the harder parts of the fish could cause an obstruction in the eaglet's crop.

Why does this nest look small?

This is a fairly young nest, the 2017 nesting season will be Mr. President and The First Lady's third year at the Arboretum. As time goes by the nest is expected to grow, the adult eagles can add from 1-3 feet of nesting material each year.

Why do they keep adding sticks to the edges?

Eagles add material to their nest to build the sides up higher in order to keep the eaglet(s) from falling out.

How large is the nest and how high up is the nest? What kind of tree is the nest in?

The current nest is approximately five feet wide by six feet deep. The tree is about 100 feet tall and the nest is about 90 - 95 feet high in that tree. It is in a huge Tulip Poplar tree.

Why is the eaglet(s) left alone?

As the weather grows warmer, the adults will leave their young for longer periods of time. Even if the eaglet(s) appear alone in the nest, the adults are likely keeping a close watch from a nearby branch.

Where's the other adult or where's dad?

During the incubation and brooding time frame, the female typically spends the overnight hours at the nest. When there are no eggs or eaglets, she would likely be perched in a nearby tree or perched in the nest tree. The male is also not usually far away, often within shouting distance. The male could be perched in a nearby tree or perched in the nest tree. During the day, the parents share duties in the nest, giving each other breaks periodically. When one is not on the nest, they are usually not very far away. When one of the adult eagles is away from the nest they could be perched, hunting for food, gathering nesting materials, or flying.

Weather & temperature. Why are the eagles panting? How do they stay warm in the winter?

Eagles are extremely adaptable to many different weather conditions. They have an internal body temperature of 102 - 106 degrees.

Colder temperatures - Eagles have dense downy feathers that help insulate them from the cold by trapping warm pockets of air against the eagle's body, their exterior vein feathers act as an overcoat by helping them stay dry and preventing heat from escaping. Changes in blood flow (less blood flow to skin and extremities) allows more blood to be supplied to internal organs, reduced activity slows the metabolism and slows energy consumption. Thick protective scaly skin on the feet and legs help against the cold, the legs and feet have very few soft tissues. Eagles and many other birds use counter-current heat exchange in their legs and feet, using the arteries and veins in their legs, warm arterial blood flowing to the feet passes close to cold venous blood returning from the feet. The arterial blood warms up the venous blood, dropping the temperature as it does so. This means that blood that flows through the feet is relatively cool. This keeps the feet supplied with just enough blood to provide tissue with food and oxygen, and just warm enough to avoid frostbite but by limiting that temperature difference between the feet and the cold, heat loss is greatly reduced. You may also see them perched with one foot tucked underneath its feathers if their feet get too cold.

Warmer temperatures - When they are hot they breathe through their mouth and pant like dogs do. Since they also do not have sweat glands, their unfeathered legs and feet help with the cooling process. They will also perch with their wings spread or bathe to help cool themselves.

These heating and cooling processes are called thermoregulation.

What is the age of the parents/ what is the lifespan of an eagle?

Unfortunately, we do not know the age of the adult bald eagles. We do know they are at least 5 years old due to their white head feathers and white tail feathers. Before the ages of 4 - 5 years old, Bald Eagles are mainly all brown, though they may have some white or pale mottling. Even their eyes and beaks are dark. As they get closer to maturity, their heads and tails begin turning white and their eyes and beaks change to yellow. Life span in the wild is less than 40 years. The oldest recorded bird in the wild was 38 years old when it died. We know this because of a USFWS leg band it was wearing. It is likely that birds can live well into their 30s or 40s and maybe beyond.

Do the parents ever sleep on the nest together?

This is not likely. The nest is created for the purposes of laying eggs and raising eaglet(s).

Eagles are large birds and the eaglet(s) become quite large, requiring lots of space to fit all the birds and their 6 foot plus wingspan.

What happens to the nest debris/Do they clean their nest/Why do the parents dig in the nest?

Eagle pairs are very different when it comes to cleanliness. Some pairs are very messy, and others are not. Parents may remove old prey remains and regularly bring in fresh nest material. Digging in the nest may help the parents find tidbits of food that have been dropped and also fluffs the nest material, moving dirty nest material to the bottom and bringing fresh, clean material to the top.

Is the nest moving?

As with any tall tree, wind may sway the tree and therefore the nest, which is built into the tree.

How did the eagles build the nest? Did humans have any part in the nest construction?

When building a new nest, the first step is to find a place for it. Preferably a territory close to water, a place where they can catch fish for the eaglets without taking too much time flying back and forth. With some pairs, the nest may be several miles from fishing areas. Generally speaking, eagles start building a new nest in a living tree and keep adding sticks to their nests for years and years. Sometimes the tree dies after many years. As long as the nest is secure, the eagles will remain there. The eagles get sticks from the ground, and sometimes break branches off other trees. Building begins where the branches are thick and strong enough to support a heavy nest, normally near the trunk but below the crown. Sticks are interwoven. They use grasses, mosses, cornstalks, Spanish moss, and other materials to fill in spaces, and will even use their own feathers. Eagles will also add greenery to the nest during spring and summer. Scientists think the greenery may act as insect repellent, it may act as a signal to other eagles the nest is in use and to stay away, it may act as camouflage, and even help keep inside of the nest clean.

Although humans are not responsible for the construction of this nest, eagle experts from the USFWS and the AEF, experienced arborists were able to place a few large tree limbs underneath the preexisting nest structure after all four eagles had left the nesting area. By late summer, one side of nest structure began to slightly collapse due to a lack of natural tree branch support underneath. There was concern that as the nest became bigger and heavier each year, that it might eventually begin to fall apart while the eagles were nesting. Fortunately, the USNA and AEF were granted permission by the U.S. Fish & Wildlife Service (USFWS) to do something about this potential problem.

These new and sturdy oak and locust support limbs have definitely added extra stability to the nest, but it's the eagle pair themselves who are exclusively responsible for the size and design of their treetop home.

Do the eagles sleep?

The eagles will sleep during the night and will sometimes sleep when they are perched during the day. Eagle sleep is not like the sleep we get. They don't go into a REM sleep like we do, one comparative study found eagles REM sleep was 10-25% lower than in mammals. Eagles tend to sleep lightly and in short durations or until startled awake by something. Eagles may sleep in a variety of positions, as stated above, some sleep while perched and some may sleep while lying down. At times, you may see what appears to be them tucking their heads under their wing while sleeping but they are actually resting their heads on their backs while they nuzzle their beaks into their back feathers. Sleeping with their head tucked on their back allows birds to rest their neck muscles and also makes for better heat conservation.

Will you ever provide food to the eagles?

Both parents are able to hunt for food, they have proven to be excellent providers.

One may stay with or near the eaglets while the other looks for food. No assistance is given to the birds, because feeding these birds would impair their ability to survive in the wild on their own.

Can the eagles see the cams?

The eagles can see the cams; however, they do not know what they are looking at. The cams become part of their environment and they don't pay any attention to them. The cams are stationary, so no movement is seen.

Do the bugs bother the eagles?

We think they do bother them to some extent, but it is a part of their lives, so they learn to live with them.

Do the parents teach them to fly? Do the parents knock them off the nest?

No to both questions. Flying is innate and is hard-wired into them. They do not need to be taught. By the time an eaglet is ready to fly, it weighs as much as an adult. Eaglets practice by hopping and catching air, eventually jumping or hopping to a branch. First flights are generally downward glides from the nest to a lower branch or to the ground.

Will you let the eaglets go when they are older?

These birds are in the wild and are free to come and go as they please.

How quickly do the eaglets grow?

The eaglets grow rapidly, they add about a half pound to a pound of body weight every week until they are about 9-10 weeks old, depending on if the eaglet is a male or female. Females are always larger.

These are estimated time frames for development milestones.

- At about two weeks, it is possible for them to hold their head up for feeding.
- At about three weeks they are 1 foot high and their feet and beaks are very nearly adult size.
- At about three to four weeks old the eaglets are covered in a secondary coat of gray down.
- At about four to six weeks, the birds are able to stand, at which time they can begin tearing up their own food.
- At about three to six weeks, black juvenile feathers will begin to grow in. While downy feathers are excellent insulators, they are useless and must be replaced with juvenile feathers before an eaglet can take its first flight, some 10 to 14 weeks after hatching.
- At about six weeks, the eaglets are very nearly as large as their parents.
- At about eight weeks, the appetites of the eaglets is at its greatest. The parents will hunt almost continuously to feed them, meanwhile at the nest the eaglets are beginning to stretch their wings in response to gusts of wind and they may even hover for short periods. The eaglets grow stronger.
- At about nine to ten weeks, they begin branching, this is a precursor to fledging.
- Around ten to fourteen weeks, the eaglets will fledge, or fly away from, the nest.
- Once the eaglets have fledged they may remain around the nest for four or five weeks, taking short flights while their primary feathers grow and strengthen. Their parents will still provide all of their food. The juvenile fledglings, with the exception of their color, look similar to their parents, but are nothing like them in behavior. The juveniles now have to learn to hunt, and they only have a few weeks left of summer to learn. After that, they're on their own. The first winter is the most dangerous and difficult part of an eagle's life.

Do Bald Eagles have any predators?

The greatest threat to eagles, besides man, is other eagles. The guarding that we witness in the nest is to protect the eaglet(s) from other eagles. Great Horned Owls and Red-Tailed Hawks have been known to threaten nests and Raccoons have been known to take both egg(s) and eaglet(s) from active nests.

What stops them from falling off their perch?

Eagles have a specialized mechanism in their foot that allows them to lock it in place so they can sleep without controlling it.

Are these parents banded?

No. They are not banded.

If something happens to one of the parents what will happen to the babies?

The remaining parent will try to take care of the eaglets. Otherwise, USFW is contacted to appraise the situation and rescue if possible.

Are the cams monitored or operated 24/7?

No, they aren't but we do have volunteers monitoring the cams periodically throughout the day.

If an eaglet does fall out of the nest will someone rescue it?

It depends on the age of the eaglet. Eagle parents will try to get them back to the nest if they can fly (eaglets cannot fly or we would be calling them fledglings or juveniles). Otherwise, USFWS is contacted to appraise the situation and rescue if possible.

Why do the eaglets' feet look so big?

The eaglets' feet reach maximum size early on in development whereas other parts of the body like wings and flight muscles develop later.

Is that a roadway or a stream visible from Cam A?

It is a roadway, but during nesting season it is closed off to visitors. You may sometimes see Arboretum staff or security vehicles on the roadway.

Can the nest be seen from the roadway or from the barricades?

Yes, it can be seen from both locations as long the leaves have fallen off the trees. Best time to view from those locations are late fall and through the winter. NEW in 2017, the National Arboretum has installed a Hi-Spy viewing scope, so patrons are now able to catch a glimpse of this bald eagle family.

Can Bald Eagles swim?

Bald eagles do not dive into the water but rather skim across the top catching fish near the surface. If a bald eagle catches a fish that is too heavy to lift, it may grasp the fish with its talons and use its wings like oars to swim to shore.

Do eagles communicate with each other?

Bald Eagles do not have vocal cords, but they communicate with each other with the syrinx, which is a bony chamber located where the trachea divides to go to the lungs.

They will also use **visual/physical communications** which can be any of the following:

- Circling or chasing animals, typically other bald eagles if they are intruding in their territory.
- Raised hackles or feathers, rouse which means the bird raises all their feathers and shakes - it is a sign of contentment.
- Once attracted to a potential partner, the bald eagle may begin one of several elaborate courtship rituals called "**cartwheeling**." In this magnificent display, the eagles soar to dizzying heights, lock talons, and begin a breathtakingly death-defying plunge to the earth. Just moments before striking the ground, the eagles disengage and once again soar to the heavens. If the timing is not perfect, certain death awaits this pair of speeding bullets.
- Eagles that are in combat with each other also may interlock their talons and fall in cartwheel fashion toward the ground.

- Other behaviors frequently observed in spring, the beginning of the eagle mating season, that may indicate courtship include pair perching, bill stroking and pecking, and overall body stroking with the bill.
- Bald eagles may call to each other to establish a territory without conflict. Calls may be used to attract a potential mate. Calls may be used to call their mate. Peeping or whining calls may be used by young eagles to communicate with the parents. The need of food is instinctual, not sure that's an actual communication.
- As in many species, the female appears to initiate courtship by assuming a more passive stance and behavior than usual. Observers have also noted a single, high-pitched call only heard during courtship or the mating period.
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Do the fledgling eagles (juveniles) recognize their parents?

Immediate fledged birds do recognize their parents and will chase or fly with them in the nesting area. Do the parents recognize their offspring after years of being away from each other? That is unknown. We have observed juveniles and sub-adults visiting established nests, the nesting adults seem to tolerate some, and others are chased away.

How good is an eagle's vision?

The bald eagle's eyesight is three to four times stronger than that of humans. Eagles use both monocular and binocular vision, meaning they can use their eyes independently or together depending on what they are looking at. An eagle eye has two focal points (called "fovea" [singular] or "foveae" [plural]) one of which looks forward and the other to the side at about a 45-degree angle. These two foveae allow eagles to see straight ahead and to the side simultaneously. The fovea at 45 degrees is used to view things at long distances. An eagle can see something the size of a rabbit at more than three miles away.

Does an eagle see in color?

Yes. Eagles can distinguish more colors than humans and have superior color vision. Eagles see colors more vividly than we do, and they can discriminate between more shades. Some studies have shown that eagles see in 5 colors vs a human who sees in 3, but there's no way to know what these extra colors, including ultraviolet, look like.

How well can eagles hear?

Eagles are not distinguished for their hearing, but this doesn't mean they have poor hearing. Diurnal (active by day) birds like eagles use their hearing to locate prey or other birds, but the sharpness is not as essential as in some owls, which can locate prey in the dark only by their sound.

Can eagles smell?

The general thinking is that eagles cannot smell well enough to locate prey. Eagles have an undeveloped olfactory bulb (a neural structure of the vertebrate forebrain involved in olfaction, or the sense of smell) in comparison to birds like vultures which have a well-developed sense of smell.

Do eagles have taste buds? Can they taste their food?

An eagle's diet is primarily fish; however, they also take advantage of already dead animals (carrion) so it's difficult to know how well developed their sense of taste would be. They do have a few taste buds and it is thought they won't eat rotting meat.

How far can an eagle turn its head?

An eagle can rotate its head approximately 180 degrees in each direction from center. Eagles have 14 cervical vertebrae, humans only have 7 cervical vertebrae and can typically rotate just 70-90 degrees in either direction from center.

What are the pointy things on the tongue?

You can see what are called barbs on the tongue. These barbs help the eaglets to pull the food to back of the throat. The barbs stay with Eaglets as they grow. The hole in the tongue is an opening to the respiratory system.

What are nares?

Nares are oval shaped openings at the base of the bill, this is one of the ways the bird can breathe.

What is a bald eagle's lifting power?

A bald eagle's lifting power is about 4 pounds or $\frac{1}{2}$ to $\frac{1}{3}$ of their individual body weight. You may have seen pictures of a bald eagle carrying a large branch, those branches may look as though they are much heavier than $\frac{1}{2}$ or $\frac{1}{3}$ of the body weight, it is impossible to prove that observation without first knowing what the weight of the bird is and the weight of the branch.

What is Imprinting?

Imprinting describes a psychological process where a young bird or animal identifies with a figure present early in life; birds raised by humans form inappropriate bonds with humans and may later be unable to form pair bonds with their own species; imprinted birds are typically unable to be released to the wild. Birds will also imprint on their natal nesting area.

What is Mantle?

Mantling is a behavior of raptors characterized by spreading the wings and tail; often to defend food.

Feathers & Flight - What is a pin feather?

A pin feather is the beginning of a new feather from a follicle under the skin. As the feather forms, its shaft (calamus or quill) has a vein and artery running up through it with a blood supply to nourish the growing feather, hence the term "blood" feather. A waxy sheath from the follicle surrounds the feather and will be sloughed off or the eaglet will pull it off once the new feather is formed. The feather's barbs unfurl and "zip" together with tiny hooklets called barbules, the blood supply recedes, the shaft turns white and remains hollow, and the feather is ready for action.

Feathers & Flight - Do the pin feathers itch?

What looks to us like scratching is not in response to an itch, it is preening, which all birds do by instinct. They may run their beaks up and down the length of each feather. This will remove dirt and parasites, and also smooth and realign the barbs which will help keep the barbules hooked together. Preening also helps remove the keratin sheath in which the new feather forms. Nest-mates sometimes preen each other (called "allopreening"), especially on the head where an eagle cannot preen itself.

Feathers & Flight - What are flight feathers?

Flight feathers are the large wing and tail feathers that provide lift and maneuverability in flight, tail feathers are spread in order to create the largest surface area and increase the effects of thermal up-drafts, acts as a braking system when landing, and helps in stabilizing control during dive or swoop.

On the wing, the outer ten flight feathers are the primaries; the inner flight feathers are the secondaries.

Coverts are the feathers that cover the base of the flight feathers. Tertials or tertiary feathers are the innermost flight feathers of the wing and attach to the humerus bone of the bird. There are usually three or four tertials.

Feathers & Flight - How many feathers does an eagle have?

The feathers on an eagle can be very sturdy but weigh next to nothing. We know a bald eagle has approximately **7 thousand feathers**, but all of them put together weighs less than 21 ounces (586 grams). If you had 30 of these feathers in your hand, they would weigh less than a penny!

Eagle feathers can be incredibly strong. Each feather is held together by more than 350 thousand hooks. The part of the feather with hooks are called hook barbules (BARB-yulz), and the parts that they are hooked to are called bow barbules.

Eagles will always have down; there are 2 down coats: hatch down and second down. During its first four weeks of life, an eaglet's fluffy white down changes to a gray wooly down that is the first and second down layer.

At about three to five weeks, brown and black feathers begin to grow and becomes fully feathered at 10 weeks of age.

Besides predators, what other threats do bald eagles face?

- **Shooting** - Most recreational hunters follow the laws and are safety conscious. Unfortunately, eagles are still being shot and killed by gunshot wounds by careless people and poachers who want to sell eagle talons and feathers on the black market.
- **Lead Poisoning** - Lead poisoning has become one of the primary causes of death for bald eagles. This poisoning occurs when the bald eagle feeds on carrion (dead animals) that have been shot with lead bullets. The lead ingested by the bald eagle from feeding on carrion, remains in the eagle's body and eventually accumulates to highly toxic levels. The bald eagle may not die immediately, but eventually suffers from the lethal effects of the lead poisoning. The problem became so serious that legislation has been passed to prevent the use of lead shot. Particularly at risk are areas where the bald eagle winters. These areas tend to be popular duck and waterfowl hunting grounds.
- **Secondary Poisoning** - In addition to lead shot poisoning, bald eagles often die from eating carrion that have been deliberately poisoned to attract undesirable predators. Farmers have traditionally put out poison to kill predators such as coyotes which are known to prey on livestock. However, many predators, including the coyote and the bald eagle, prefer to scavenge already dead prey and to save their energy when possible. As a result, farmers who resort to illegally poisoning dead animal carcasses have inadvertently killed other wildlife.
- **Electrocution** is among the top five causes of bald eagle deaths. A bald eagle perched upon a high-voltage power pole may inadvertently touch the power source and the ground at the same time. When this happens, the bird is killed instantly. Bald eagles may also fly directly into power lines that are not visible in poor weather conditions. Naturalists propose three suggestions for improving the safety of current power lines for bald eagles: removing the top crossbar to make them less attractive perch sites, installing a barrier to prevent the eagle from touching the ground and power source at the same time, and building artificial perches above the crossbar where electrocutions usually occur.
- **Habitat Destruction** - Today, even as the bald eagle population slowly recovers as people work together to restore the country's national symbol to its former status, new man-made threats continue to arise. The factor which most significantly affects the future of the bald eagle population is the destruction of its natural habitat. As the human population grows, the bald eagle population declines. The most destructive human activity is the development of waterfront property. Because eagles depend on shoreline habitats and aquatic food sources, human development in these coveted areas poses the greatest threat to the bald eagle's survival. In addition, the cutting of "old growth forests" where bald eagles prefer to nest and perch has conflicted with the interests of people seeking lumber for housing and commercial products. The sensitive

issue of accommodating human needs and desires while at the same time preserving our wildlife resources can destroy communities. However, working together to come to reasonable agreements regarding the protection of wildlife can also have the opposite effect. At one time, only the bald eagle itself was protected by law. Today, the eagle's "critical habitat" is also protected, but only on public lands. Habitat management plans today call for groups of concerned citizens, agencies, and organizations to work together to reach common agreements regarding changes in the environment. Most habitat management plans concerning the bald eagle involve protecting nesting trees. Agreements which allow buffer zones around these sites have permitted human activity while preserving bald eagle nests. The most important weapon in the fight to save the bald eagle will be the education of and communication with people.

UNTRUE MYTHS ABOUT EAGLES

Is it a myth that eagles extend their lifespans by removing their beaks, talons, and feathers in order to grow new ones?

Yes, this is a myth and is **totally untrue**. Eagles would not typically "lose" their beak or talons unless it was the result of a traumatic injury. The talons and beak are two of the three best features of what makes these birds "raptors". Without the talons for catching prey and the strong beak for tearing food, the eagle would likely die of starvation. An eaglet hatches with both a beak and talons and these will continue to grow throughout the bird's life, like human fingernails and hair are made of keratin. Eagles and other raptors generally do not pluck out their feathers. All birds do go through an annual process of losing feathers and growing new ones and this is called a molt (however, it happens gradually, so the bird doesn't lose flight ability or become more susceptible to the elements). A bird's feathers suffer regular wear and tear so ultimately the quality of the feather will decrease, and it will need to be replaced. Eagles and all other raptors need feathers to fly in order to hunt and survive so the loss of flight would most likely mean starvation for the bird. We believe that eagles typically live less than 40 years in the wild. The Bald Eagle, like many other living things, does not have the option to extend their life cycle beyond what is normal for its species. In captivity, an eagle may live beyond what the average wild life expectancy is because it receives both regular and nutritious meals and has access to veterinary care.

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