▪ All About the Owl ▪

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2nd Edition

Have you ever wondered: can owls turn their head 360°? Can they see in complete darkness? If you have seen an owl in your backyard or local park before, you've probably pondered on these myths. Everything about owls, from their keen nighttime vision to their silent flight, has fascinated humankind for centuries, creating positive and negative reputations. Most of the time we are around owls, we don't even know they're there. Because of their elusive nature, many people do not know a lot about these birds. Scientists often find owls hard to study for the same reason. The owl is a very interesting bird with unique physical features, fascinating behaviors, and interesting idiosyncrasies.

In order to understand everything about owls, you must know some preliminary information. Owls are almost always immediately recognizable when seen, so *what makes an owl an owl*? The answer to this question is not a clear set of definitions but rather a list of general characteristics. First, all owls are birds of prey, along with other birds such as hawks and eagles. A downward-facing sharp hooked beak, strong feet with large talons, and predatory nature all characterize birds of prey. Some other characteristics that are a part of (but not restricted to) owls are a broad flat face, a top-heavy appearance, and an unusually high eye to body size ratio. Although not visible from the outside, owls are some of the only birds that do not have a crop. The crop is the organ (in most birds) that regurgitates partially digested food

(usually to feed their young) (Taylor 2012). Many of these characteristics contribute to the taxonomy of owls.

By analyzing owls' traits, scientists organize owls in the science of taxonomy; this helps them see what other birds they are closely related to. There are between 222-268 species of owls living today (World of Owls 2019). All owls are a part of order Strigiformes. There are two families within this order: Tytonidae and Strigidae. Family Tytonidae contains 16 species (Backhouse 2008) of barn owls, grass owls, and bay owls (Fig. 1-3). Common features of family Tytonidae owls include a heart-shaped facial disk, unusually long legs, and a middle claw that has a comb on it (Marshall and Gill 2019). It is not unusual for family Tytonidae owls to be island endemic species (Marshall and Gill 2019). The only common Tytonidae owl in North America is the American barn owl (Fig. 1). Family Strigidae contains 189 living species and four extinct species (which were classified after extinction). People often refer to them as "typical" owls. Most owls that we see commonly are part of this family (Fig 4). Classification allows scientists to analyze what other types of birds are most closely related to owls; interestingly, owls' closest relative is not the hawk, but rather Order Caprimulgiformes, commonly known as nightjars (Fig. 20) (Backhouse 2008). Although not part of the taxonomy of owl, another trait most owls have in common is that they are mainly active at night.

Most owls are either fully or partially nocturnal; many of their specialized features are designed for nighttime activity. Studies that researched the time of day owls hunt indicated that approximately 69% of owls are nocturnal during hunting, 3% are diurnal, 22% are crepuscular (active during dawn and dusk), and 6% are unknown (World of Owls 2019). As an example, the northern hawk owl (Fig. 5), is diurnal (active during the daytime). Although these owls are active in the daylight, they still have many of the same features as nocturnal owls, such as sharp eyesight and silent flight. One way to tell whether an owl is nocturnal or diurnal is to look at the color of their eyes; if their pupils are black or orange, they are generally nocturnal. If they are yellow, they may be nocturnal, diurnal, or crepuscular (Taylor 2012). The owls' tendency to be nocturnal makes them hard to study without special equipment. Another challenge scientists encounter while studying owls is the terrain owls live in; many owls often live in extreme habitats.

Owls' habitats vary extraordinarily throughout the world; they live on every continent except Antarctica. Most owls live between sea level and 8,200 ft., although some owls live at 15,000 ft. in South America (Backhouse 2008). Owls live in every type of habitat, from deserts to rainforests, and tundra to grasslands. Owls are known to be very adaptable birds. The snowy owl lives in climates with frigid temperatures and the Jungle Owlets can live in sweltering temperatures near the equator. Now that you know the basic information about owls, owls' physical features will be more understandable.

I. Physical Features

The unique physical features of the owl are often the first thing that comes to mind when thinking about owls. For example, owls' eyes are one of the most notable characteristics. Many of owls' physical features are designed to perform a specific task; this specialization is quite striking considering the fact that owls are very adaptable birds. Almost all of an owl's features are specially devised to live and hunt during the night. For example, owls' eyes are specifically designed to see at night.

An owl's eyes are a very fascinating part of their physical features. They are very sizable in proportion to their body size. An owl's eyes can even be as large as a human eye (Backhouse 2008). The mass of their eyes can be up to 5% of their body mass (World of Owls 2019). As a rule, the bigger an eye is, the more light it can collect; this is particularly helpful to owls.

If you look at the diagram of an owl's eye (Fig. 6), you will notice that because of limited space for such a large eye, owl eyes are very "tubular". These "tubular" eyes create a long-sighted eye, creating advantages and disadvantages (Taylor 2012). Although most of the time an owl is viewing their prey from a distance at which their vision is excellent, when they get close, they must depend on other senses. In a study conducted on how far-sighted owls are, scientists concluded that snowy owls' nearest focus distance was 166

cm (5.5 ft.), great gray owls' was 85 cm (2.8 ft.), and great horned owls' was 50 cm (1.7 ft.). As well as being farsighted, owls are mostly color blind. They have a minimal number of cone cells (color sensing) on their retina, and a large number of rod cells (light-sensing) (Backhouse 2008). A tawny owl's rod to cone ratio is approximately 1,000-1; the human ratio (rods to cones) is 20-1(Taylor 2012). The more rod cells an eye has, the better it can see at night.

Many studies have been conducted on the abilities of owl's eyes. Owls cannot see in total darkness (contrary to the popular myth)— no animal can. As far as the light-sensing ability of their eye, scientist Ghram Martin conducted a study showing that owls can see in light 100x lower than what a pigeon can see. However, a domestic cat can see in light 2x lower than an owl (Backhouse 2008). Scientists have estimated that the lowest light an owl can see in is 0.00000073 foot-candles; this is equivalent to the light given off by a candle that is 1170 ft. away (Backhouse 2008). In terms of how well they can see on an average night, an owl can see a mouse moving at 1800 m (½ mile). Scientists have also speculated that some owl species can see in UV light, although none of the owls' prey coloration shows any difference in UV light, so this may not be of any use to them (Backhouse 2008).

Fig. 6 also shows a bone ring surrounding the eye called the scleral bone. This bone prevents the owl from moving its eyes at all. To compensate for this, owls have incredible head turning abilities. Contrary to myth, owls cannot turn their head 360°; an owl *can*, however, turn its head a total of 270° side to side

(World of Owls 2019) and entirely upside down (Backhouse 2008) (Fig. 7). Owls can do this because of 14 cervical vertebrae in their neck: double the amount that a human has.

Owls also have poor depth perception because of the aforementioned fact that owls are unable to move their eyes. To obtain better depth perception (a necessary component to hunting at high speeds), owls use a technique known as parallactic localization. This technique is performed when an animal moves its eyes (or entire head) back and forth, comparing how the image changes in order to tell how far away something is. A commonly seen example of this is when a pigeon bobs their head back and forth while they walk. You may have seen an owl move their head in circles while looking at something that interests them.

Owls also have a relatively wide binocular vision (the part of their vision that both eyes can see at the same time). They have a total vision (the farthest extent of the left eye to the farthest extent of the right eye) of 110° and a binocular vision of 70°. In comparison, humans have a total vision of 180° and a binocular vision of 40°. Woodcocks (a woodlands prey bird) have a total vision of 360° but a binocular vision of only 10°. To protect their eyes, owls have three eyelids: the sleeping eyelid, the blinking eyelid, and the nictating membrane. The sleeping eyelid is only used for, well... sleeping. The blinking eyelid is closed in situations potentially dangerous to their eyes, such as catching prey, transferring prey between mates, or giving food to their chicks.

The nictating membrane is a transparent eyelid used for regular cleaning and moistening of the eye, and it travels horizontally across the eye (World of Owls 2019). Although owls' eyes are one of the most commonly talked about (and researched) features of owls, owls' ears also gain a considerable amount of attention from scientists and commoners alike.

Even though we cannot see them, owl ears have a renowned reputation; owls can hear 10x better than humans. Flaps called operculum (plural opercula) cover the owls' ears (Fig. 8); these flaps are movable and can funnel sound. Most of the reasons why owls have such amazing hearing are not the ears themselves, but rather the features around the ears. The flat facial disk on owls majorly contributes to excellent hearing. The stiff feathers on the outside of the facial disk are called the facial ruff, and they help funnel sound into the ears. The facial disk of an owl works similarly to a TV dish; a barn owl's facial disk amplifies the sound 10 times (Backhouse 2008).

Another feature that aids the some (but not all) owls in their hearing is asymmetrical ears. The concept of asymmetrical ears all has to do with locating from what direction the sound originated. To find where a sound is coming from, the owl's brain measures the minute differences between when the sound reaches each ear and then faces the head in the direction at which the sound hits both ears at the same time. This technique is called binaural fusion; when the ears are symmetrical, the brain can do this easily on a horizontal axis. Owls can also perform binaural fusion on a vertical axis, but

not efficiently. The owl's brain cannot possess both sets of information (horizontal and vertical) fast enough to determine an accurate position of the sound on a horizontal and vertical at the same time. With asymmetrical ears (i.e., one on the top left and the other on the bottom right), the owl's brain is able to combine the information for the vertical and horizontal planes. Forty-two species of owls are known to have asymmetrical ears.

An owl's best hearing range is from 0.5 to 9KHz; this is right in the scope of the frequencies a rodent makes when it moves around. A study done on barn owls showed that they could hunt in complete darkness, just using their hearing. Owls can even hear prey moving under 45 cm (18 in) of snow (Backhouse 2008). A study that measured the number of neurons in the medulla (the part of the brain that interprets sound) showed that an owl has 95,000 neurons, compared to 27,000 neurons in a crow (Taylor 2012). The more neurons an animal has in its medulla, the better it can decipher sound. Although owls' hearing is one the best in the animal kingdom, they wouldn't be able to hear anything if they made as much noise as other birds do when they fly.

Owl's feathers are very different from other bird's feathers; they are specialized for nighttime hunting and daytime hiding. If you have ever seen an owl, you probably didn't hear it. This is because of specialized feathers that make their flight silent. Owl wings are usually between 0.3 and 2.0 meters, creating a low wing load (a large wing for a small amount of body mass). The

outside edge of owls' flight feathers is very stiff and comb-like; the inside edge has no barbs to hold them together, so they look wispy. Owls also have a velvety layer on the top of their wings. All of these features contribute to reducing large pockets of turbulence into small micro pockets of turbulence, thus cutting down on the amount of sound their wings make (Backhouse 2008). If owls' feathers made more noise, they wouldn't be able to hear when they were hunting.

Feather coloration tends to be very bland in owls. This is because both owls are color blind and to provide camouflage. The former makes sense; there would be no reason to have bright colors if other owls can't see them. Often, an owl's habitat may correspond to its feather coloration(e.g. white colored feathers in a snowy habitat). Feather color may differ within the same species who live in different areas; an example of this would be the eastern screech owl (Fig 9), which comes in three different morphs. The word "morph" refers to variations within the same species. All owls usually have some variety or mixture of brown, gray, black, and white. In general terms, owls who live in forest habitats tend to have darker colorations while owls who live in open grasslands habitats tend to be lighter colored. Owls who live in deciduous forests are generally browner, owls who live in evergreen forests are usually grayer, and owls who live in jungles are often very dark brown. Some owls who live in snowy northern regions have insulated white colored feathers (such as the snowy owl [Fig. 10]) (Taylor 2012); the snowy owl has the second thickest

coat of any bird in the world. Although the eyes, ears, and feathers of owls are the most noticeable physical features, some other features (such as feet or ear tufts) can be just as interesting.

A less noticeable feature of an owl is their feet. An owl's foot is very similar to other birds of prey's feet. Some owls have feathered feet (especially in cold climates), and some have bare feet (such as fishing owls). An owl's foot usually consists of two toes forward and two toes backward, but not always. This is different from most passerines (songbirds) which have three toes forward and one toe backward. Owl feet are powerful to restrain prey from escaping; it would take about 29 lbs of force to open an owl's foot (Backhouse 2008).

Some species of owl have ear tufts (Fig. 11), and although they have nothing to do with hearing, they may provide camouflage. There are many theories on what owl ear tufts are for, some more likely than others. One approach is that they look like mammal ears and discourage other animals from attacking them; this theory is unlikely though because several species of owl with ear tufts live on an island where no mammals live. The most widely accepted and plausible theory is that the tufts disrupt the usual pattern of the owl to blend in with tree bark (Backhouse 2008).

Smell, taste, and feel are not an owl's particularly strong points. Owls do not have any significant sense of smell, at least not enough to hunt by. Owls can taste, but because owls usually swallow their prey whole, there is no need

to taste anything (Backhouse 2008). Owls do have the ability to feel things, but because most of their body is covered with feathers, they don't feel things very often. Owls do, however, have feeling hairs on the bottom of their feet, so they know when to close their talons when catching prey (Taylor 2012).

II. Behaviors

Owls' fascinating behaviors can be very different from other birds, including other birds of prey. Their behaviors can be grouped into three categories: hunting, mating, and regulatory actions. Hunting techniques used by owls are unique in the fact that owls are some of the only predatory birds that hunt at night. Mating behaviors of owls are interestingly different from hawks and eagles; owls do not make their own nests but instead use other birds' nests or cavities. Some of an owl's regulatory actions may include roosting, hooting, maintenance behaviors, and migration. Many of owls' hunting techniques are specific to what type of prey the owl is trying to catch; owls that eat several types of prey may use several different hunting techniques.

Owls eat a wide variety of prey. Owls are known as very adaptable birds in this aspect; they will eat whatever they must to survive. Although owls are generally carnivorous (and some feed exclusively on certain types of prey), most are open to whatever is available (even plant material) (Taylor 2012). The largest group of prey animals owls eat is rodents. Some common rodent prey animals are mice, rats, voles, and lemmings. Owls will also eat reptiles, fish, amphibians, birds, other mammals, insects, and carrion. Owls have even been observed killing and eating other smaller species of owls. Many small species

of owls are strictly insectivorous. Although many owls catch small prey (such as mice), they are not afraid to catch prey larger than themselves (such as waterfowl). Sometimes this is not very beneficial to the owl because they cannot lift the prey off the ground (Backhouse 2008). Because owls eat such a large variety of prey, they often have many different hunting techniques that they can use.

Owls may use one or several hunting techniques, depending on their habitat and the prey type. Hunting techniques can be divided into three major groups: sit and wait, pursuit, and theft. Sit and wait is the most common technique used by owls. When using this method, an owl will find a perch overlooking an area where prey is; then, when it sees a meal, it will take a dive for it. Another form of sit and wait is called quartering; this is where an owl flies silently a few feet above the ground, and when it sees prey, it immediately drops on it. Ambush hunting is also categorized in the sit and wait group. This involves waiting in an area where the owl knows there will be prey. An example of this is an owl waiting at dusk next to a bat cave to catch the bats when they fly out for the night. Pursuit hunting involves chasing prey (usually birds) and it also may require “flushing out”. Flushing out is a technique where an owl flies through an area with prey in it, thus scattering them and making them available for chase. Theft among owls is not uncommon. Owls usually steal from other smaller owls; more often though, owls get stolen from by other birds of prey. If a kill is too large to carry away, a ground mammal may also

take it (Taylor 2012). After catching prey, they eat it— something that can be somewhat disturbing.

Most of the time owls swallow their prey whole unless it is too large to do so. Because owls swallow their prey whole, they eat many indigestible parts of the prey including feathers, bones, claws, fur, and teeth. Since owls cannot digest these things, they must be expelled from the mouth as a pellet (Fig. 12). Once an owl has eaten and a pellet is forming, the owl cannot eat any more until it has got rid of the pellet because the pellet partially blocks the digestive system (Taylor 2012). An owl expels a pellet approximately 16 hours after eating (Backhouse 2008). Although eating is very important to sustain life, owls must also support the next generation of owls.

The first step to mating in owl species is to attract and court a mate. As a rule, owls are usually monogamous, either for the mating season or for life. A male will often hoot from his territory in hopes of attracting a female. If the male succeeds in attracting a mate, the female will inspect the male's territory, checking for potential nest sites. To impress the female, some males use a variety of techniques including courtship flights, caching, and allopreening. Courtship flights involve the male doing acrobatics in the air to impress the female; sometimes the male will hand off prey to the female in mid-air. Food caching is done by the male to show his competency to supply food; because the male caches more food than they could eat, most of it goes to waste. In Michigan, a barn owl cached 189 mice; in Canada, a great horned owl cashed

two hares and 15 pocket gophers. Allopreening is when two owls mutually preen each other by gently rubbing their beak through their partner's feathers, especially around the face (Backhouse 2008). Even though the male owls "own" their territory, the female is the one who picks which nest site to use.

If the male succeeds in impressing the female, the female will then choose one of the nest sites within the male's territory. Owls may be cavity nesters, platform nesters, or rarely, ground nesters. If an owl is a cavity nester, it will look for old woodpecker holes, nest boxes, or natural tree cavities. If an owl is a platform nester, it will look for old bird nests or cliff faces. Owls seldom ever build their own nest, with the exception of ground nesters who may dig a very shallow depression for their nest. There is also one species of owl that nests underground, adequately called the burrowing owl (Fig.13); it uses holes dug by mammals such as groundhogs as their nests. Because there are not a lot of nest sites suitable for owls, there is competition for nest sites between owls and other birds (including other owls and mammals such as squirrels). Sometimes owls will evict other birds from their nest sites or vice versa. Usually, shortly after choosing a nest site, the male owl will copulate with the female owl (Backhouse 2008).

When owls begin mating differs from species to species. Whether an owl will mate at all may depend on the population levels of prey animals. Usually, a few weeks before egg-laying begins, the female starts to sit in the nest site while the male feeds her. As the female produces the eggs, her mass goes up

drastically; for example, the female flammulated owl's mass goes up by 68% during this time. Some owls may not even be able to fly before laying their eggs. Because owls nest where their eggs are mostly protected (plus being guarded by extremely defensive females), there is no reason for camouflaged eggs. Owl eggs are almost entirely white, one to two inches, and perfectly round. Shortly after becoming pregnant, owls begin to lay their eggs; owls do not lay all of their eggs at one time, but instead, lay them one to three days apart. Owl clutches are usually two to four eggs. As the female gets ready to lay the eggs, the feathers on the "brood pouch" fall off (to have better heat transfer to the eggs). Once the female lays all of the eggs, she will begin to incubate (lay on the eggs to keep them warm) them; if the owl lives in a cold climate, she may start incubating the eggs right away. On average, the female owl will incubate the eggs for one month (Backhouse 2008).

Because the female does not lay all of her eggs at one time, they do not hatch at the same time. This non-synchronized hatching can sometimes lead to older siblings getting more food because they are stronger. When the eggs hatch, the chicks are blind and helpless. At this point, the male owl must feed himself, his mate, and his chicks. For most bird chicks, the time the chicks leave the nest is when the chicks fledge (have the ability to fly). In owls, however, the chicks first leave the nest after about three to five weeks after hatching, and they fledge at some point after that. When the owls' chicks first hatch they are born with natal down; these are their first feathers. After the

initial natal down comes the second natal down, and after this comes the juvenile feathers. The juvenile feathers (Fig.14) may or may not look like the adult plumage. The adult feathers then come after the juvenile feathers. When the owl chicks leave the nest, they almost immediately try to use their wings (and are often very unsuccessful at first). Long after the owl chicks leave the nest, the male and female keep feeding them until they can hunt for themselves. A lot of the movement owl chicks make once they leave the nest is using their feet and beaks to climb around in the trees; this gives owl chicks their nickname "branchers" (Backhouse 2008). Because owl chicks leave the protection of the nest before they are able to fly and protect themselves, they are most vulnerable at this time.

The most likely time for an owl to die is within its first year of life. Sometimes before the owl chicks fledge they fall out of a tree and cannot get back up; this leaves them in danger of being eaten by ground mammals. If mammals, such as martins, find and invade the nest, then there is little chance the female or the chicks will survive. Seventy-five percent of all barn owls die in their first year; only 20-30% of burrowing owls live in their first year. The most common causes of death for owl chicks in their first year are predation and starvation. Unfortunately, owl chicks can be very noisy when calling for their parents, so this can lead to alerting predators where the vulnerable owl chicks are (Backhouse 2008). Because owls leave the nest at an early age, young owls learn how to find good roosting sites very quickly.

There are several behaviors that owls do on a day to day basis; as previously mentioned, these can include roosting, hooting, maintenance, and migration. During the day when owls are not hunting or caring for young, owls roost. Owls sleep very lightly because they are very vulnerable to attack from daytime animals. To avoid being attacked, owls may depend on their camouflage or being out of sight. Some owls prefer to roost in a tree and depend on their camouflage to keep them hidden during the day (Fig.15). Other owls prefer to roost in cavities; this can be dangerous, however, because if a predator attacks the owl, the owl can't escape. When owls are disturbed while roosting, they will often stand up very tall, squint their eyes, and raise their ear tufts (if applicable). Some owls return to the same roost every day while others choose a different one each day. Occasionally owls are observed community roosting (Fig.16). The more eyes and ears, the better the protection. Since owls are solitary though, most prefer not to roost in groups (Backhouse 2008). As soon as dusk comes, owls that roost in groups go their own way to begin calling and hunting.

Not all owls hoot, contrary to popular belief. Some owls "hoots" may even be screeches. Hooting can be for several different reasons including territorial hooting and mating hooting. It is common for owls to hoot every night to proclaim their territory, but only males do this. Some other sounds owls make may include bill-snapping and wing-clapping. Bill-snapping is usually a sign of aggression or stress; it often occurs when an owl is being

threatened. Some owls have been observed wing-clapping. Scientists are not exactly sure how owls do it. Although hooting is normally done at night, some other behaviors owls perform regularly (such as preening) are usually done in the daytime.

During the day when an owl is not hunting, they often perform regulatory actions such as preening, scratching, bathing, and dusting. Preening involves aligning the feathers to be perfect for flight. Preening is the most observed of the regulatory actions; it is not only done during the day, but also at night after a hunt. Scratching is often to clean the area around the beak of food debris. Although rarely seen, owls do occasionally bathe in shallow streams. Dusting (which helps absorb excess oil on owls' feathers) has also been observed in some owl species (especially species living in desert habitats) (Backhouse 2008).

III. Idiosyncrasies

Owls have many very interesting idiosyncrasies. Their idiosyncrasies can include the relations of owls and humans, owl extremes, and owl conservation. Many ancient cultures have myths and beliefs concerning owls; for example, Athene (also known as Athena), the Greek god of wisdom, supposedly had an owl (two owls today get part of their scientific names as Athene) (Backhouse 2008). Because of owls' uniqueness in behaviors and features, they have created both good and bad reputations for themselves. Conservation of owls is essential in ensuring that owls will be here for generations to come. Scientists have measured owl extremes in many categories such as size, habitat, and abilities. In modern times, the most seen reputations of owls are the good ones.

Humans' relations with owls are very different from humans' relations with other birds. Some cultures had traditions and beliefs that owls were good. In aboriginal Australia, owls were said to protect women's souls, and in return, women should protect owls. In South America, native tribes-people kept pygmy owls in cages; it was thought that the owl would bring the luck and success in love. The Ainu people of Japan believed that the eagle owl was their "divine ancestor" and would often drink a toast to it before a hunt. The Pima Indians thought that placing an owl feather in the hand of a dying person

would guide them to the afterlife. A more modern example of good owl reputations is the book series *Harry Potter*, where owls carry messages for the young wizards. Along with the good reputations, owls also have bad reputations (Backhouse 2008).

Some other cultures had customs and faiths that suggested owls were evil. In Cicely, if a scops owl hooted near the house of a sick man, legend said the man would die in three days. In Zapotec, Mexico, the barn owl was said to bring terrible news. Many cultures thought that by eating or wearing certain owl parts, they would gain owls' powers. An example would be eating owl eyes or wearing owl feathers for night vision. Much of owls' scientific nomenclature relates owls with sorcery (Backhouse 2008). Part of what gave owls their bad reputations is their extremes; owls' extremes can be part of several different categories such as weight and environment. Although there are many extremes that owls have within just owls, owls own some of the extremes within birds in general.

The extremes of owls in terms of size or habitat are extraordinary. The largest living owl in the world by mass is the Eurasian eagle-owl (Fig.17), coming in at 8.8 lb. The largest living owl in the world by size is the great gray owl (Fig.18). The largest owl ever was an extinct 3ft. tall owl that lived in Cuba. The smallest owl in the world is the little owl (Fig. 19) whose weight is 1.2-1.9 oz. The highest altitude owls live in mountains that are 15,500 ft. tall. The only two true ground-nesting owls are the short-eared owl and the snowy owl.

Some owl extremes, such as size, make it difficult for scientists to study and conserve owls. Very small owls are hard to find, and very large owls have been known to attack people when guarding their nest (Backhouse 2008).

Owl conservation is a challenging field to work in because owls are so secretive. Scientists consider a large number of owl species to be "critically endangered", this is the category of owls that are in danger of extinction the most. The main unnatural threats to owl populations are invasive species, habitat loss, and killing. The main problem invasive species cause is competition for nest sights (Taylor 2012); in the desert areas of the US, invasive starlings will evict owls from their limited nest sites inside of cacti (Marshall and Gill 2019). Habitat loss is mostly due to deforestation, which cuts down on the number of nest sites. Although the killing of owls is not nearly what it used to be, car collisions are still high on the list of significant owl threats. To combat all of these threats, habitat protection, targeted intervention, and reintroduction come into play. Many countries have created areas where owl habitat cannot be destroyed, thus creating spaces for owls to live. Everybody can help with targeted intervention by putting up a nest box for an owl. This simple act helps to combat the loss of nesting sites. Reintroduction has been useful in some areas where owl populations have been destroyed. Scientists have also used banding as a way of measuring the owl population to know how to best help owls (Taylor 2012).

Many people agree owls are one of the world's most unique, fascinating, and strange birds. They have captivated the human mind for centuries. In conclusion, owls are some of the most exciting birds to study, with their physical features, behaviors, and idiosyncrasies. Next time you see an owl, what will come to your mind, will it be their amazing eyesight, or possibly their ultra-sharp hearing? Whatever aspect of owls you think of, just remember that it was all purposely and specially designed by our amazing Creator.

"Owl," said Rabbit shortly, "you and I have brains. The others have fluff. If there is any thinking to be done in this Forest–and when I say thinking I mean thinking–you and I must do it." – A.A. Milne (from *Winnie the Pooh*)

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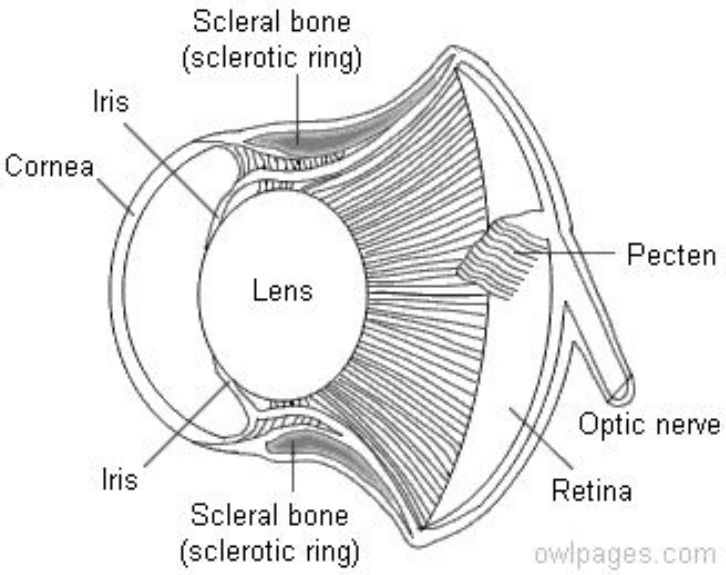

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