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SENIOR THESIS APPROVAL

This Honors thesis entitled

“Extinct and Extirpated Birds and Mammals of Arkansas”

written by

Nora Smith

and submitted in partial fulfillment of the
requirements for completion of the
Carl Goodson Honors Program
meets the criteria for acceptance
and has been approved by the undersigned readers.

April 15, 2008

Extinct and Extirpated Birds and Mammals of Arkansas

Arkansas was purchased from France as part of the Louisiana Purchase in 1803 (1). Parts of it were explored by the Dunbar and Hunter expedition in 1804-05 (2). In 1819, it was detached from the Missouri Territory and made a separate territory. By 1821, the capital moved to Little Rock, and on June 15, 1836, Arkansas became the 25th state of the United States of America (1). The Arkansas Game and Fish Commission was established on March 11, 1915, and the first “real” law pertaining to game hunting was passed. The commission started to establish game refuges in 1929, and by 1960, it operated 22 refuges that covered approximately 725,520 acres (2).

Birds

Passenger Pigeon *Ectopistes migratorius*

The passenger pigeon was a gallinaceous bird that thrived in the forests of North America east of the Rocky Mountains (3). This bird preferred deciduous forests and could be found west through to Washington and Nevada (4) but was not found on the Pacific coast (5). The passenger pigeon lived in huge flocks of thousands of birds whose flight would block the sunlight as in an eclipse and would take several hours to pass overhead (6). The flapping of their wings was said to sound like thunder. Their flight had no set order (4, 5), and the birds' movement largely depended on food supply (3, 4). These birds fed largely on mast such as acorns, beechnuts, and chestnuts. They were also fond of fruit and wild berries, and insects make up the main part of their diet during nesting season. The passenger pigeon was also fond of salt and would frequent natural salt licks and salt bait set out by hunters (6). These birds had excellent eyesight to

discern where the mast was most plentiful. While feeding on the ground, the birds in the rear of the flocks would constantly fly to the head of the group so that the flock appeared to be in constant, rolling motion (5, 6).

The passenger pigeon not only traveled in huge flocks, but nested in huge colonies as well. In the year 1876, these birds settled near Petosky, Michigan. The nests filled almost every tree for eight miles of hardwood timber, crossed a river bottom of arborvitae and then through a stand of white pine for about twenty miles (4). During courtship, which took place in the trees, the male would act haughtily and follow the female everywhere with his tail spread wide and his wings drooping, uttering a bell-like call (6). While building their nests, the male brought the female nesting materials. The female placed the material then gave a call for more (6). The noise of the nesting birds could be heard for miles and was likened to the sound of wood frogs (4). The female usually laid two eggs (5), although many nests contain only one egg (4, 6). These eggs were pure white and elliptical, equally rounded at both ends (5). Both the male and female participated in incubation. The female sat all through the evening, night and early morning, while the male sat in the late morning through early afternoon (4, 6). The male and female coordinated their leaving and arrival at the nest so that the eggs were constantly covered (4). Nesting would usually last around five weeks (4), and after hatching, the young would stay in the nest for around fourteen days (6). The young were then forced out of the nest by the male (4). Although the chicks struggle, they eventually gave up and fluttered to the ground. In three or four days, the chicks were able to fly fairly well and fend for themselves (4, 6). The passenger pigeons would raise three to four broods a season but would never use the same nesting site twice in a row (4).

Adult birds were often confused with the mourning dove although the passenger pigeon was much larger than the mourning dove and did not have the spot on the neck as does the mourning dove. Passenger pigeons were French gray with a red breast. The males had red irises; females had orange irises. Flight sounds differ between the passenger pigeon and the mourning dove as the passenger pigeon's wings did not make a twittering sound as it rose. The voice of the passenger pigeon was loud and boisterous (6). The most common note they uttered is the repetitious 'kee-kee-kee.' During breeding, these birds made a cooing sound like other pigeons (5), but this sound was not loud enough to be heard in a large group of birds. When the bird was alarmed it made a sound that resembled something between a short bark of laughter and a child's trumpet (6).

Because there were no laws restricting the hunting of the passenger pigeon, they were slaughtered by the thousands in the early 1800s (7). While the Native Americans refrained from hunting the passenger pigeon during its nesting season, which extended from spring through summer, the white man saw no harm in destroying the breeding birds (6). Laws put in place in Michigan and Wisconsin allowed hunting and trapping during the breeding season as long as it was done outside of the nesting area (4). The birds were sold by the dozen at markets and were quite valuable commercially. As forested areas shrank, the birds were concentrated together and were easier to trap. Any laws that were passed to protect the birds were either protested or ignored due to the seemingly endless supply of birds (6). By the turn of the 20th Century, the passenger pigeon was practically extinct in the wild (7). In the year 1896, the N.W. Judy & Co. in St. Louis, Missouri, who had regularly shipped the pigeons to market, had not had

pigeons for two years. The last shipment they had received was from Siloam Springs, Arkansas. The last nesting of any size was near Grand Traverse, Michigan (4), and the last wild birds may have disappeared around 1898 (6). Three pairs of birds were given to the Zoological Gardens at Cincinnati, Ohio, and they reproduced and grew into a flock of 20 (4). From the year 1910-1912, rewards were offered for the finding of live, nesting birds. Although sightings continued to be reported up until 1930, most were probably a misidentification of a mourning dove or band-tailed pigeon (4). The last known individual bird was a female named Martha from the flock at the Cincinnati Zoo. She died at the age of 29 on September 1, 1914 (7). After the disappearance of the birds, there were many rumors that it had mysteriously disappeared due to a natural disaster of some kind. Among those suggested were tornadoes, forest fires, epidemics, etc, but the birds had been dealing with and surviving these disasters long before they became a commercial asset. The destruction of the forests may have also played a part in the extinction of the passenger pigeon. They may have been forced to nest farther and farther north, decreasing their ability to successfully raise young (6). The birds were simply exterminated by over-hunting and habitat destruction.

Carolina Parakeet
Conuropsis carolinensis

The Carolina parakeet was the only native parrot of the United States until it became extinct in the early 19th Century (8). This bird lived in the southeastern states (9) and north to southwestern Missouri. Its range extended west to the Mississippi River and the timberlands of its western tributaries including those of Arkansas (10). Although the Carolina parakeet traveled in large flocks and roved frequently, it was not migratory, and

its movements were dictated by food availability (11). The Carolina parakeet flew in search of food during the day and returned to the same roosting place several nights in a row. This roosting place was usually a hollow tree in which they clung to the inside with their claws and beaks (10). The food it searched for were seeds of the cocklebur and beech mast (11). They also became very fond of cultivated fruit (10, 12), and were sometimes observed feeding on thistles and the blossoms of certain types of maple trees. The Carolina parakeet was an excellent climber and would hang upside down to pick off seed pods. Their flight was extremely swift and darting, and their flocks resembled those of the passenger pigeon (10). The parakeets would fly from their nightly roost in the early morning to feed, roosting again in the middle of the day and feeding again in the late afternoon.

The Carolina Parakeet was thought to have nested in large colonies (10), and preferred to reside in hollow trees (11). Nests were often seen out on the forks of branches as the bird's social nature kept them from searching out more suitable cavities (10). The female would deposit the eggs at the bottom of the hollow in the tree with little to no nesting material (11) beginning in the late spring or early summer. Although the exact number is not known, these birds may have had three to five eggs in a set (10). The eggs were very round, had a greenish tint (11) and were very pitted (10).

The Carolina parakeet was a very brightly colored bird. Its head and neck were yellow with a brick red forehead. Its body and tail were green, and it had a yellow belly. The bill was white, and the legs were flesh colored (11). There is some disagreement on whether both sexes were colored alike or if females had a green head instead of yellow (10). While in flight, the bird would utter the monosyllable 'qui' repeated several times

with the last drawn out to 'quiiii.' They were very noisy birds except while they were roosting during the night or in the heat of the day (11).

The Carolina parakeet started to decline in number in the 1880s. With no laws restricting hunting or trapping, these birds were killed as pests and for their bright plumage or captured to be pets (9). The bird made a nuisance of themselves with their fondness of cultivated fruit and a large flock could devastate a field or orchard in one day. When an individual bird was wounded, its companions would circle around it. Farmers who viewed the birds as pest could destroy whole flocks because of this tendency (12). The invasion of the bird's habitat by civilization also played a large part in their disappearance. Their numbers were still considerably high as late as 1860 but were starting to decline. Sightings of pairs of these birds were reported in Louisiana and at the Linchpin Camping Grounds in Stone County, Missouri, as late as the fall of 1891 (10). The last Carolina parakeet died at the Cincinnati Zoo in 1918 (9).

Ivory-billed Woodpecker
Campephilus principalis

The ivory-billed woodpecker could once be found throughout the Southern Atlantic and Gulf States. It ranged north to North Carolina and West to Arkansas and eastern Texas (11). They were the largest members of the *Picidae* family found in the United States (10). The ivory-billed woodpecker was a graceful flier although it only flew for a few hundred yards except when crossing a river. The bird would glide from tree to tree as if swinging on a string (11). The ivory-billed woodpecker needed large amounts of forest to survive; a single pair needed at least sixteen square kilometers of forest (13). Their food consisted of beetles, larvae, and large grubs (11) which it would

dig from dead trees with gusto. It braced itself with its stiff tail feathers and used its whole body to forcefully peck at the tree. This action would make a sound like someone hitting the tree with a hammer (10).

The ivory-billed woodpecker traveled and nested in pairs (11) and was believed to mate for life (10). Both the male and female participated in digging the nest which was usually a hole that had been dug into a live tree beneath a large limb (11). Nests were never dug in rotten wood or wood with sap as a partly dead tree was almost always chosen. The eggs were deposited on fine wood chips at the bottom of the cavity and were pure white and very glossy. Both the male and female participated in the incubation which lasted between sixteen and eighteen days. Once the eggs hatched, both parents participated in feeding the chicks which would remain with the parents for at least a year as only one brood was raised for the season (10).

The ivory-billed woodpecker was named for its ivory or horn white colored bill. It had a glossy black body with a white stripe which began under its eyes and ran down the sides of its neck and each side of its body. The flight feathers were also white. Both the male and female had a crest, the female's being all black and the male's being black in front and red in back. The red began just above the eye and ran to the back of the head (11). The ivory-billed woodpecker was a very silent bird and never made a sound while flying (10). While climbing about on the trees in search of food, it made a short, loud sound resembling that of a trumpet or a high note on the clarinet repeated three times (11). The birds had another way of calling to each other. They would tap rapidly on a dry limb to produce a sound similar to that of the roll of a drum (10).

The specialized diet and the amount of forest needed by these birds made it especially hard for them to survive as forests were logged and their habitat shrank. The ivory-billed woodpecker was rare by the 1930s. This caused even more trouble as collectors sought the birds for their collections. The last accepted sighting of the ivory-billed woodpecker was in April of 1944 on the Singer Tract in Louisiana; this land was cleared in 1984 for soybeans. The bird was thought to be extinct until one individual was seen and videotaped in the Cache River National Wildlife Refuge in the Big Woods area of Arkansas in 2004 (14). It is not known whether there are a few birds or just one left, and there are major efforts taking place to try to find others (13).

Prairie Chicken
Tympanuchus cupido

The prairie chicken was once very numerous in the Grand Prairie area of Arkansas which contained 320,000 acres of the tall grass prairie preferred by the birds (15). Although it was extirpated from Arkansas in 1917 (2), the prairie chicken is still among the more popular game birds of the Middle West (6). The prairie chicken was a seed eater, feeding on different cereals, seeds and berries (4); their eating habits are adaptable, and their diet varied from season to season depending on what food supplies are available. The bird was fond of mast and eats large amounts of grain and corn. It was also partial to rose hips (6). As a chick, this bird ate mostly grasshoppers and other insects (4).

Courtship begins in March (4) and reaches its maximum in late April and May. The males gather in the early mornings at traditional open fields (6) where the grass is short (4), and each bird selects a spot about 9.14 m from the next bird (6). The male has

two yellow air sacs, one on either side of his neck, which he inflates as he begins his display. He raises the black, pointy feathers on his neck and the feathers of his tail and lets his wings droop to the ground like a turkey (4). As the birds let out a booming call, the air sacs deflate (6). While booming, the male runs through the groups of gathered females, and this display is repeated several times (4). The booming sounds like a kettledrum (8) and can be heard from a good distance away. The males stop displaying before morning is over and return the next day to repeat the process. These activities go on for a week or more or until all are paired (4). The prairie chicken nests on the ground (6) where the grass is thick (4) on open prairies and fields (5). The bird makes a shallow excavation and lines the depression with whatever it can reach from this position (4). The thick vegetation hides the nest and provides some protection from extreme temperatures (6). The eggs are clay colored to tawny brown and have tiny spots of darker brown with about 8-12 eggs in a set (5). The female does all the incubation and may cover the eggs with grasses when she leaves the nest to feed (6). Incubation lasts between three and four weeks (4). Usually a single brood is raised per season, but a second, smaller set of eggs might be laid if the first set is lost (4, 5). If surprised on the nest, the female will fly noisily away only to drop to the ground a little ways away and pretend to be injured. She performs this trick several times to lead the intruder away, and once well away from the nest, she will rise and fly gracefully away to return secretly to the nest. All the chicks hatch at about the same time and leave the nest once they have dried. They follow their mother and she protects them fiercely, charging at enemies, signaling the chicks to hide in the grass with a sharp, shrill call (6). The chicks are able to care for themselves by August and several families come together for the winter (4).

The prairie chicken is seen as a pest by farmers because of the damage they cause to orchards and winter grain fields (5). During the 1900s, the bird was popular in market hunting (6) and would sell for \$5-10 a pair (5). As the human population increased and the bird's habitat was destroyed for agriculture, the prairie chicken began to disappear from much of its former range (6, 15). Prairie chickens were still numerous in Arkansas in 1845, and hunters would bet on who could kill the most. Laws protecting the bird were poorly enforced, and a ban on hunting the prairie chicken in 1893 came too late. The last prairie chicken in Arkansas was killed in 1917, extirpating the bird from the state (2). Since then, stricter restrictions and various conservation programs have helped the prairie chicken reclaim some of its former range in Arkansas and increase its numbers. One of the dangers that the birds face is the fires that sweep across the prairies during the nesting season. The problem of agricultural interference is beginning to be solved with the establishment of large state game reserves to protect the birds (6).

Ruffed Grouse
Bonasa umbellus

The ruffed grouse is a bird that is widely dispersed throughout the forests of North America and is the most hunted grouse species (16). The bird prefers slightly hilly areas with thick undergrowth and some areas of open ground, fields, and meadows (4). The ruffed grouse eats mostly seeds, buds, nuts, fruit, and insects (6). Young chicks live on ants, beetles, small insect larvae and grasshoppers (4). The adult birds also are fond of eating the buds of apple trees and can do some considerable damage to orchards (4, 5, 6). This budding can kill a tree, but can also be beneficial to the tree if the birds do not take too many buds (6).

The mating season begins around March (4) and the drumming of the male birds can be heard for some distance (5). The male finds a large rock or log to stand on while performing his display. He stands almost vertically, braced with his tail feathers, and flaps his wings very quickly in front of him to make a drumming sound. The sound is either produced by the wings hitting each other in front of the bird (6) or the fast movement of the wings through the air (4). The male will return almost invariably to the same drumming site year after year (5). When a female arrives at his perch, the male will strut about with drooping wings, spread tail, and fluffed neck ruff (5). The nest of the ruffed grouse is almost always in dense cover at the base of a tree or a large rock (6). The bird scratches out a hollow in the ground and lines it with leaves, dry grass, and whatever else that can be found around the nest (4, 6). The male will stay with the female until she begins to sit and will not rejoin her until winter (4, 5). The female will lay 7-12 eggs (5) which are milky white with small spots of a reddish brown color (4). Incubation lasts around 24 days (6). When disturbed, the mother will fly off loudly and will fly a long way away before stopping (5). The chicks leave the nest after they hatch and are cared for by the mother (4, 5, 6). To protect her brood, the mother will try to distract the intruder by charging or pretending to be injured while the chicks hide in the undergrowth. Because ticks can kill a young chick, the mother will teach them to dust themselves to get rid of parasites (4, 6). The young birds will stay with their mother for the fall and winter before setting off on their own (5, 6).

Over-hunting played a major role in the ruffed grouse's disappearance from Arkansas since kills of around 30 birds in a day were reported in the state before 1900, and no records of the birds were made after 1900. Destruction of forest habitat may also

have contributed to their extirpation from the state. No attempt to bring them back was made until 1948 when 100 ruffed grouse were purchased from the Sandhill Game Farm in Babcock, Wisconsin. Other purchases helped to restock the state, and populations rose to about twelve hundred in 1994 (2). Habitat loss is still a threat to these birds (16), and since Arkansas is almost at the southern edge of the bird's range, it may never be extremely numerous in the state (2).

Osprey
Pandion haliaëtus

As one of the largest birds of prey in North America, the osprey is a fish eater and is often called the fish eagle. It ranges over much of North America and South America (17). As fish is its staple food, the osprey prefers to be near water and migrates south in the winter to avoid the cold (5), following waterways as it travels alone or in pairs (18). While fishing, it flies with deliberate strokes of its long, narrow wings about 15-30 m above the water (18). When the bird sees a fish in the water below, it stops its flight and hangs in the air for a moment. It then closes its wings and dives down (4). It hits the water with its feet first and may either pluck the fish from the surface where it was basking (18) or disappear underwater for a few seconds to emerge with a fish in its talons (4). In flight, the osprey always carries its captured fish headfirst (18) and will even turn the fish in midair to have it facing forward (4). The osprey is a very efficient fisher and is successful in catching a fish over 90 % of the time (18).

The osprey nests from April to June in trees about 60 feet above the ground (4). The male brings nesting materials of sticks, dried seaweed, and driftwood to the female who arranges it (18). Osprey use the same nest year after year and add more to it so the

structure can become quite large (4, 18). The female lays around three eggs that are white and marked with browns and grays (18). The female is fed by the male while she incubates the eggs for around 30 days (4, 18). While raising young, the male will defend the nest, often making dangerous charges (5). After hatching, the chicks can sit up within 14-16 days (18) and are fed torn up fish by their parents (4). After about 42 days, the chicks are able to feed themselves and fly for the first time around 52 or 53 days. The young and adults separate around late August and September (18).

The osprey does not have a very high breeding success which may be caused by disturbances by humans and chemical sprays (18). It was absent from Arkansas between 1943 and 1983. This occurrence was linked to the use of an insecticide called DDT. This chemical interferes with the production of eggs and does not allow for proper calcification of the shells so that they are too thin. DDT was banned in the 1970s and the osprey came back in 1983 with offspring being produced in 1984 (2). The osprey is still endangered in some states (17), and while there are no management laws in Arkansas, the bird is protected and its numbers continue to grow (2).

Mammals

Ocelot *Felis pardalis*

The ocelot is a medium sized feline with tawny to golden fur. It has spots and stripes and a long tail. Its total length is 920-1370 mm, and its tail is 270-400mm. Its hind foot is 130-180 mm and has a weight of 9.10-18.20 kg (19). The ocelot was once thought to range as far north as southern Arkansas in the 1800s (20). Today, it is extirpated from Arkansas (21) and lives no farther north than southern Texas (20). While

it lived in Arkansas, the ocelot could be found around the Red River in southern Arkansas (22). It prefers shrub and forest habitats and fed on mice, rats, rabbits, birds, snakes, lizards, fish, frogs, and young or small domestic animals. The ocelot can climb well and is a good swimmer. When it mates, the female will give birth to a litter of 2-4 kittens after carrying them for 70 days. The cat is usually solitary but has been observed to travel in pairs, keeping in contact with each other with meows like those of the domestic cat (19).

Habitat loss is a major factor in the decreasing range and number of the ocelot (19, 20). It is also killed by farmers to protect their small livestock and birds and for the trade of furs. Mother ocelots were killed so their kittens could be sold as pets (19, 21), but since the ocelot is now protected in the United States, it is illegal to sell ocelot pelts and kittens (19). The cat is currently being monitored to gain more information about how to help it recover some of its former range (21).

Florida Panther *Felis concolor coryi*

The Florida panther was once found in most of the southern states, including Arkansas (23). The Florida panther is also known as the cougar or mountain lion (22). Other common English names are puma, catamount, panther, and American lion (24). This large, powerful cat has a long tail that is tipped in black; its ears are also black on the outside. Its fur is pale brown to reddish brown and fades to a dull white on its undersides (22). There have been several reports of black panthers in Arkansas, although most are unconfirmed. Melanism, or a black cat, is found in South American populations but no verification of this color phase has been found in North America (22). The Florida

panther is the largest unspotted cat in North America (24, 25) with a total length of 1500-2743 mm. Its tail is 534-900 mm long, and its hind foot is 220-295 mm. This cat can weigh between 36.10 and 103.18 kg (22). Each individual cat has a large range that can be up to 112.65 km across and are solitary (24). These cats are very silent (22) and avoid human activity whenever they can (25).

Deer make up a large part of the cat's diet (22, 24, 25), and it hunts them mostly by stalking (24). The Florida panther will also eat other prey such as feral pigs, rabbits, raccoons, foxes, and possibly domestic livestock (22). The panther spends most of its d but is an excellent climber and leaper (22, 24). It is very strong and often drags its prey a great distance before eating (22, 24). If the cat does not eat the whole prey, it will cover the leftovers with sticks and leaves and return to the kill until it starts to decay (22, 24, 25).

The Florida panther has no set breeding season although most kittens are born in the spring (24). Males will sometimes fight ferociously for females, and the male will stay with the female for around two weeks (24). During one estrous period, females usually mate with only one male (25). After a gestation period of 90-96 days the mother will give birth to 2-3 kittens (22, 24) which have a spotted coat and a ringed tail. At birth they weigh around 0.23-0.45 kg, and their eyes open around 10-14 days (24). The kittens remain in the den for two or three months before accompanying their mother on nighttime hunts (22, 24, 25). The young stay with their mother for at least a year (24) and have a life expectancy of seven to nineteen years (24).

The scream of the Florida panther is perhaps its best known trait and is said to sound like a woman in mortal terror (24), but panthers make other sounds besides this

scream. The kittens mew and are answered with a grunt from their mother. The adult Florida panther can yowl, growl, hiss, purr, and can make high-pitched trilling sounds somewhat like a bird (24). The Florida panther is relatively free of external parasites. Those that it does pick up come from its prey (25).

Destruction of habitat is a large danger to this cat (26). Large areas of wilderness with healthy deer populations are quickly vanishing (22). Other threats include car strikes, inbreeding (26), and diseases such as feline distemper and feline calicivirus (27). Recovery programs mainly focus on improving the existing populations and improving the genetic diversity of the cats. Potential reintroduction sites are also being located and studied (23).

Red Wolf *Canis rufus*

Of the two wolf species, the red wolf is much less known than its cousin the gray wolf (28). It was once found throughout the southeastern United States including Texas and Oklahoma and ranged north to Indiana and Virginia (25). The red wolf is larger than the coyote; it had a larger head and longer legs (22). The fur of the red wolf is a tawny color. This color darkens to almost black on the back and lightens to a pinkish buff or white on the belly (22, 25). The red wolf is smaller than the grey wolf and can weigh between 15.91 and 40.91 kg. Its total length can be 1355-1650 mm; its tail 343-432mm; and its hind foot measures between 210 and 245 mm (22).

Red wolves prefer to live in pine forests and hardwood forests in bottomlands (25). The male helps the female dig a den 9.15 m deep in sloped ground; the den may have several entrances (24). Dens for raising young have been found in the banks of

ditches, hollow logs, and under stumps. The wolves usually try to hide the entrances to these dens behind piles of brush, shrubs, or vines. The red wolf usually travels in mated pairs sometimes with an extra male. They also come together in small groups of 5 to 11 wolves for short periods of time. The red wolf is mostly nocturnal and rests during the day (25) but becomes more active during the day in winter (19). Around the den, the wolves mostly walk and travel to their hunting grounds in a trot of about 12.87-16.09 km per hour that they can keep up for hours. They pursue prey in a lope that can reach 40 miles per hour and usually don't pursue their prey into water although they can swim very well (24). There are a few unreliable reports of the red wolf attacking domestic animals, but it is not a major predator or big game (25). Although it will occasionally hunt white tailed deer, the red wolf's main foods are rabbits, small rodents, and birds (19).

Mating season for the red wolf begins in February (19, 24) every third year (19). After a gestation period of around two months, the mother gives birth in April or May (25). The average litter size is around 6 pups (24, 25) but can range in size from 2-10 pups (19, 25). When they are born, the pups' eyes are sealed shut and they are covered with wooly, brown fur. Their eyes open within 5-9 days and their mother stays with them at all times for the first few weeks. Her mate and any unmated wolves with the pair hunt for her. The pups are weaned when they are 6-8 weeks old. Then the adults regurgitate food for the pups until they are able to hunt for themselves. When the pups are around three months old the den is abandoned, and the older wolves teach the pups how to hunt. Although most pups stay with the family until they are old enough to raise their own

families, some leave in the spring (24). Red wolves are thought to reach sexual maturity at 2 years (25), and they can live to be 10-18 years old (24).

The red wolf is now extirpated from Arkansas. Because of fear, red wolves were killed in huge predator control programs in the 1960s (29). The poison strychnine was the most devastating weapon used against the wolves. Guns, snares, and dogs were also used to eradicate them (24). The red wolf was declared endangered in 1973, and the few that survived in southern Louisiana swamplands (25) were trapped by the U.S. Fish and Wildlife Service (19, 29). These wolves were used to start a captive breeding program in North Carolina (19). This program was very successful, and the red wolf became the first United States species to be successfully reintroduced into the wild (30) when 14 were released into the Alligator National Wildlife Refuge in North Carolina in 1988 (22). This number increased to 26 by the year 1992 (19). Over 38 zoos and other organizations work together to keep the population of red wolves healthy and genetically diverse (28, 30). The most significant threat to the species today is interbreeding with coyotes (25, 29).

Black Bear *Ursus americanus*

Although the black bear is the largest mammal in Arkansas today (31), it is the smallest of the bear species living in North America (24, 32). This bear was once found in all North America except for areas in Canada and the southwestern deserts. Today, these bears can be found in areas of the Appalachian Mountains and remote area of Arkansas, Louisiana, Mississippi, Alabama, and Georgia (25). It does not have a shoulder hump like the brown bear and the grizzly bear (24), and its fur is a glossy black

to light brown (22) with a brown nose (25). Its profile is straight and it walks on the soles of its feet (24), or plantigrade (24, 25). The black bear has five toes on each foot (24) with non-retractable claws (22). Its total length ranges from 1250 to 1800 mm; its tail is short and 80-125 mm in length. It can weight between 100 and 227.27 kg. Males are larger than females (25).

Black bears live in heavily forested areas and swamplands (22) and need 13 to 39 square kilometers of habitat to obtain sufficient food, water, and cover (24). Black bears are solitary except for females with cubs (19, 22). They are omnivorous and eat berries, fruit, nuts, insects, fish, chicks of ground nesting birds, and some large mammals like deer and mountain sheep if they can be caught. The bears will also eat carrion (24). The black bear is mostly nocturnal (22, 25) and will bed down in dense thickets and brush during the day (25). Although its walk seems lazy and slow, the black bear can gallop at speeds around 48.28 km per hour if it is frightened. The black bear readily climbs trees for safety or food and are strong swimmers. They swim in a straight line and will climb over objects in their way including boats and canoes (24).

In the autumn, black bears gain layers of fat to sustain themselves through their winter dormancy. The black bear is not a true hibernator and can become active if disturbed (24). The bear usually dens under the roots of trees and dense thickets during November and December and does not eat, drink, defecate, or urinate while in the den. The bear will lose 20-27% of its body weight before emerging in the spring (22). Weather often determines the time of emergence, and the bear will drink large amount upon emerging to re-hydrate its intestines before eating (24).

Mating season for the black bear occurs during June and July (22, 24). The male and female play with each other before copulating (24). The gestation period is 6 to 8 months after delayed implantation. The cubs are born in January or February while the mother is hibernating. They are born almost naked and tiny, weighing between 0.170 and 0.280 kg (22, 25). The female is very protective of her cubs which stay with her for around a year and a half. The cubs go with the mother into hibernation during their first year. They may leave as soon as spring comes or may stay with the mother until fall (24). The young bears usually reach sexual maturity at 3 years (22, 25) and reach their adult size at around 6 years of age (25).

Arkansas used to have such a large population of black bears that it was called 'The Bear State' (31), but habitat destruction and over-hunting decreased the bear's numbers (31) until it was extirpated from the western part of the state (32). There is a town in Independence County called Oil Trough that supposedly received its name from the large amounts of bear oil that was stored there in troughs made from hollow logs while waiting to be shipped down the White River (22). Remnant populations of the black bear remained in the Ozarks, Ouachita Mountains, Mississippi River bottoms, and the White River National Wildlife Refuge. Between 1959 and 1967, the black bear was successfully reintroduced in Arkansas by bringing in bears from Minnesota and Canada (31). The original black bears of Arkansas were probably of the subspecies *Ursus americanus luterolus*. The bears introduced from Minnesota and Canada were of the subspecies *Ursus americanus americanus* (22). About 3,000 bears currently live in Arkansas, and since 1997, a limited hunt has been allowed (31). The harvest levels rise each year as population of bears continues to grow (32). Since one of the bear's favorite

foods is honey, it can be quite a nuisance to beekeepers. The bears can also cause considerable damage to orchards and berry patches, and the Arkansas Game and Fish Commission trap and relocate problem bears (22). They can do this with confidence since a translocated bear seldom has the drive to return to its former home range (24). The future of the black bear looks fairly certain although habitat destruction remains a concern (32).

Elk *Cervus elaphus*

The elk once occupied most of North America (33) and is second in size only to the moose (24, 25, 34). The elk, also called wapiti, is brownish gray in color with shaggy, chestnut brown hair on the head and neck. It has a yellowish rear, and its belly and legs are darker than its body (24). The elk has a total length of 2130-3800 mm, a short tail of 550-850 mm, and weighs 310-900 kg. The bulls are larger than the cows (25). Elk also have two canine teeth that are not present in any other deer species. These teeth have no known function (24).

Elk live in herds usually composed of cows, calves, and young bulls and led by an old female (24). They browse on a wide variety of plants, and some populations migrate between their summer and winter ranges (25). While grazing in open areas some members of the herd are always on alert for danger while the others are resting or eating. Elk are most active in the early morning and again in the evening. They spend midday resting and chewing cud. When elk run they tend to hold their noses high. This behavior stems from the bulls having to lay their large antlers along their backs to keep them from becoming entangled in low branches (24). Elk can run at speeds of 56.33-64.39 km per

hour for short distances and can jump very well. An elk never jump higher than it has to, though, and almost always hits the top of the obstacle with its feet (24).

The antlers of the male elk grow faster than those of any other deer species. They start to grow in March and reach full their size by July. In August, the antlers harden and lose their velvet (24). This is when the breeding season, or rut, begins (25). The bulls will gather all the females they can find and spend their time posturing and uttering their famous high-pitched bugle. Fights between two large males are usually resolved with two or three charges, but they sometimes fight to the death. These activities take place over 4-6 weeks, and the bulls must eat heartily to regain the weight that they lost during that time (24). The gestation period is around 8 months and calves are born in May or June. Twins are very rare (25). The female will leave the herd to give birth to a calf of about 13.63-18.18 kg that is reddish brown in color with white spots along the sides and back. After a week, the mother and calf will rejoin the herd. Calves are usually weaned by August and shed their spots in September. They are able to breed when they are a year old, although yearling males seldom get to participate in breeding activities (24). Males often have to wait until they are three years old before they are big enough to hold their own. Although there is no evidence of age affecting male fertility, female elk more than 8 years old begin to have decreased fertility (25). Elk live for around 15 years (24), and the females usually live longer than the males. Some elk are known to have lived for 20 years (25).

The subspecies *Cervus elaphus Canadensis* was native to Arkansas before over-hunting drove them to extinction in the 1840s. The subspecies *Cervus elaphus nelsoni* was introduced to Arkansas in the Franklin County Black Mountain Refuge in 1933.

Unfortunately, the herd established from 3 bulls and 8 cows disappeared in the mid 1950s. Habitat limitations and poaching are suspected causes of this disappearance but have not been confirmed (33). In 1980, Arkansas agreed to trade largemouth bass for elk from Colorado (35). Between March of 1981 and 1985, 112 elk were brought to Arkansas (33) and released along the Buffalo River (35). Today, the elk range is over 22,500 acres due to work done by the Arkansas Game and Fish Commission to improve the elk habitat along the Buffalo River. The herds in Arkansas may never be as large as herds in the west, but they do provide many wildlife watching opportunities (33). A hunting season was established in 1998 (36) after it was found that elk herds must be harvested in order to maintain a healthy population (24). This hunting season continues today with a limited number of permits available through a random draw (36).

American Buffalo or Bison
Bison bison

The American bison was once spread throughout North America (37) and ranged from northern Mexico to Canada and Alaska (25). Today, the only large herds in existence are in the Yellowstone National Park, Montana, Wyoming, and other western states and parks (37). Bison are also kept on private ranches (24). Bison, which are more commonly known as buffalo (24), are members of the cow family and are the largest North American terrestrial mammal. It is estimated that their populations were between 75 million (38) and 30 million (25) animals at their peak. Bison have a thick, wooly undercoat with coarse guard hairs. The hair on their head, shoulders, and front legs is long and shaggy while the rest of their body is covered by shorter hair (25) which can be dark brown to almost black. They also have beards hanging from their chins, humped

backs, and curved horns that grow throughout their lives (24). Their total body length is 2130-3800 mm with a tail of 550-850 mm (25). The bulls can be quite large, standing almost 1.83 m tall and weighing almost 900 kg. The females are smaller and weigh between 363.64 and 409.18 kg. A white buffalo is an extremely rare occurrence, and the Native Americans claim that these animals are sacred (24).

The bison live in huge herds that are normally led by an old female, but this leader is not always the same individual (25). When frightened into a stampede, the rest of the herd blindly follows this leader. The size of these herds forces the buffalo to move frequently in search of food (24). They are active during the day where grazing periods are alternate with times of rumination (25). The buffalo is a very hardy animals and is able to survive extreme heat, cold, and drought; they can go three our four days without drinking water. Bison usually travel at a walk of around 8.04 km per hour. They can also trop and gallop during which all four feet leave the ground together. Bison can also swim very well and can float well enough to keep their heads above the water (24).

The breeding season begins in August and extends to October (25). The bulls gather a harem and fight with each other by butting heads. They will lower their heads, raise their tails and charge at each other from a distance of 6.10 or 9.15 meters, bearing the impact on their foreheads. Eventually, one will give up (24). The estrous cycle of the female lasts around three weeks (24), and they are receptive for about 24 hours during that time. While she is receptive, the bull tries to copulate with her as many times as possible. If a female does not conceive during this first cycle, she will go through another cycle 28 days later. After a gestation period of 270-275 days, a single calf will be born (24). Twins are very rare. The calves are reddish brown and weigh 15-25 kg.

Calves usually nurse for 7-8 months (25) and most are weaned by late summer. Their hump starts to develop when they are two months old (24), and they will gain adult color after four months (25). Most cows and bulls start breeding when they are three years old and can live for 25 years or more (24).

Although bison were extremely numerous in Arkansas, they were extirpated by 1837 (2). Over-hunting played a huge role in the decreasing numbers as bison were shot for food and sport. From 1870-1875, hide hunting became a huge business (24) and by 1900, only 300 bison remained in North America (38). They were declared endangered and protected in areas such as Yellowstone National Park and their numbers have increased and have become stable (37). In 1929, the Arkansas Game and Fish Commission acquired one buffalo and released it at Lake Catherine in Garland County, but their reasons for doing so was unknown. No other attempts have been made to reintroduce this species back into Arkansas (2).

Conclusion

Some common factors in the extirpation or extinction of these species are over-hunting and habitat destruction. The idea that nature's bounty was unlimited led many hunters to slaughter both game animals and non-game animals. By the time wildlife laws were passed, it was too late to help many species like the passenger pigeon and Carolina parakeet. Habitat destruction, the other cause of extirpation and extinction, occurs mainly because of clearing forests for farmland or for the paper industry. Insecticides and other chemical pollutions are also responsible for the extirpation of the osprey and possible extinction of the ivory-billed woodpecker.

Although many species of birds and mammals have been extirpated from Arkansas or have become extinct, considerable efforts are being taken to bring some of these species back. Success stories like the red wolf, black bear, elk, and even the recent activity with the ivory-billed woodpecker can inspire people to take a greater interest in their environment. Hopefully, people will be inspired to help the animals that make Arkansas so beautiful thrive.

Images

Birds

Passenger Pigeon



Martha, the last passenger pigeon (7)



Male passenger pigeon (3)



Passenger Pigeon egg (39)

Carolina Parakeet



Carolina Parakeet Adults and Juvenile (12)

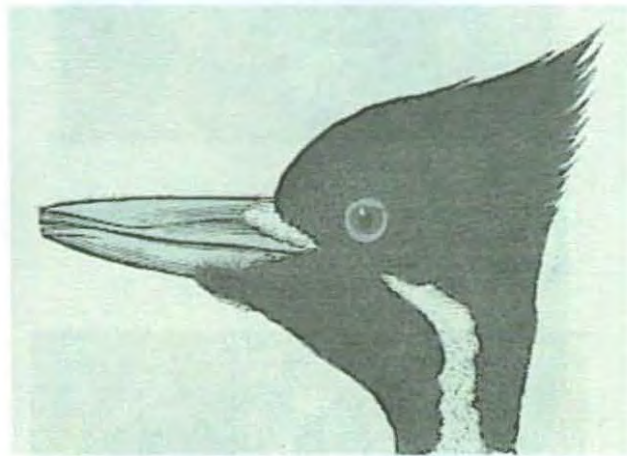


Parakeet Egg (10)

Ivory-billed Woodpecker



Male (13)



Female (11)

Prairie Chicken



Male (40)



Female (sitting) Male (standing) (40)



Males fighting (40)



Eggs (39)

Ruffed Grouse



Male (40)



Female and Chick (40)



Egg (39)

Osprey



Adults and Juvenile (fishing) (18)



Juvenile (2)



Egg (4)

Mammals

Ocelot



Adult (19)



Kitten (41)

Florida Panther



Adult (22)



Female and Kitten (19)

Red Wolf

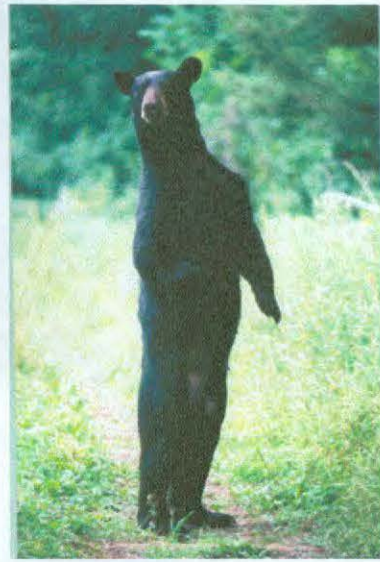


Adult (19)



Adult and Pup (28)

Black Bear



Adults (31)



Female and Cub (19)

Elk



Male Bugling (19)



Group of Females and Older Calves (34)



Calf (34)

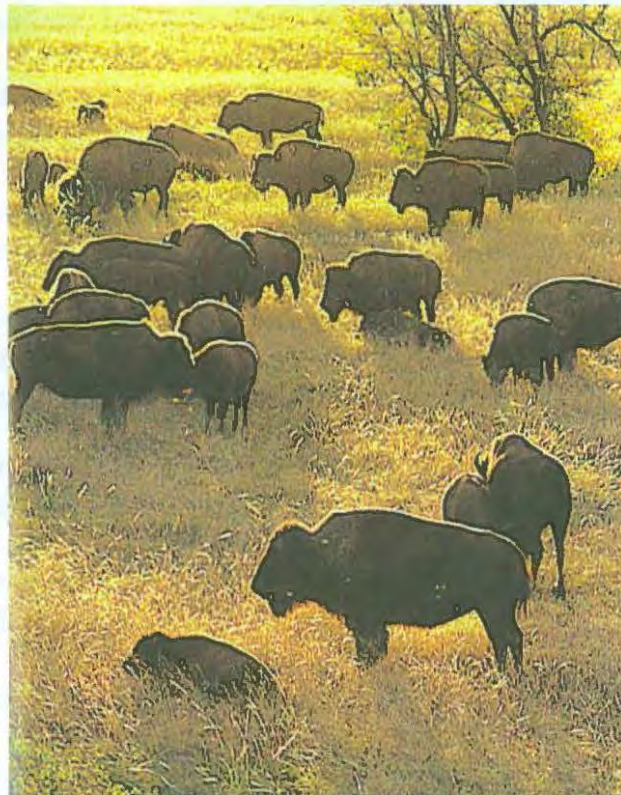
Bison



Adult (38)



Calf (38)



Bison Herd (19)

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