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THE KANSAS SCHOOL NATURALIST

Vol. 28

No. 2

Emporia State University

Emporia, Kansas

Dec.

1981

The Kansas School Naturalist

Published by

Emporia State University

Prepared and Issued by

The Division of Biological Sciences

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The Kansas School Naturalist is sent upon request, free of charge, to Kansas teachers, school board members and administrators, librarians, conservationists, youth leaders, and other adults interested in nature education. Back numbers are sent free as long as supply lasts. Send requests to **The Kansas School Naturalist**, Division of Biological Sciences, Emporia State University, Emporia, Kansas, 66801.

The Kansas School Naturalist is published in October, December, February, and April of each year by Emporia State University, 1200 Commercial Street, Emporia, Kansas 66801. Second-class postage paid at Emporia, Kansas.

"Statement required by the Act of August 12, 1970, Section 3685, Title 34, United States Code, showing Ownership, Management, and Circulation." **The Kansas School Naturalist** is published in October, December, February, and April. Editorial Office and Publication Office at 1200 Commercial Street, Emporia, Kansas 66801. **The Naturalist** is edited and published by Emporia State University, Emporia, Kansas. Editor, Robert F. Clarke, Division of Biological Sciences

D.O.R.

Robert J. Boles

Great numbers of blood-thirsty killers roar across the countryside. Completely fearless, they crush and kill any animal that crosses their paths. Fossil records show that these monsters first appeared on Earth at about the start of the century. At first they were slow and few in number, but now they have multiplied, increased their speed, and spread across the land until no place is safe from their assault.

Spring, summer, winter, and fall the slaughter goes on. Not

only active by day, at night their cold, unblinking eyes probe the darkness. The light briefly outlines their victim before it is ruthlessly crushed into oblivion.

The killers?—the modern American car and truck!!! This issue of the *Naturalist* presents some data as to the extent of this slaughter, and a biologist's ideas and suggestions as to some of the possible reasons for the tremendous loss of wildlife on our highways.

RABBITS

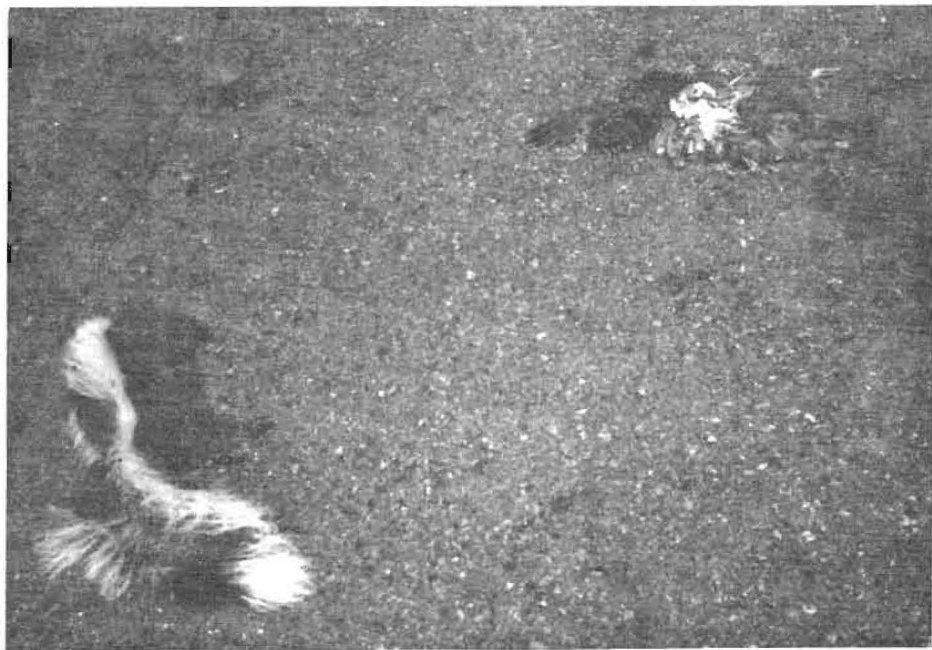
Readers of the older generation will recall the tremendous numbers of jack rabbits that used to be killed on the highway back in the "dust bowl" (dirty 30's) era. Today, jack rabbits are seldom seen on the road, but the ubiquitous cottontail holds the dubious distinction of being the

number one victim of the gasoline-and diesel-driven vehicles.

Such numbers are no doubt partly due to the fact that the cottontail is one of the most abundant of the larger mammals. However, hedge rows and uncut grass and brush along the rights-of-way also tend to concentrate them where they are more likely to be struck. The active mammals are constantly moving in search of mates, food, and defending their territories from

Dr. Robert Boles is Professor Emeritus of Biology at Emporia State University, and a former editor of the *Naturalist*.

The cover picture of the deer kill by courtesy of the Kansas Fish and Game Commission. All other pictures by the author.



Using the roadway for a dining table can be a fatal experience, as can be seen from what happened to this skunk.

other rabbits. This activity means many trips back and forth across the roads—a sort of “Russian roulette” as far as the danger of getting hit is concerned. Fast as a rabbit is, many do not escape the crushing wheels.

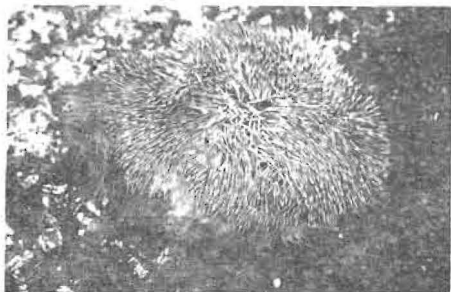
Kills are most common in the fall, as that is when the cottontail population is the highest, and one is more likely to be on the road. Rabbit numbers decrease rather rapidly as winter progresses, with fewer around to become victims. There is a rise again in the spring as those that

survived the winter start searching for mates and summer homes and feeding areas.

SKUNKS

Skunks are one of the most common kills seen on the highway. One reason is that there is a rather high population, with many on the road. However, other factors play a part in the number of kills.

Few animals will face an aroused skunk. Anyone who has seen the frothing at the mouth, gagging, and rolling in the dirt by a



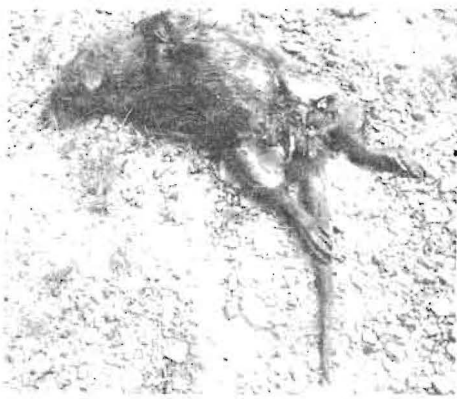
This little hedgehog, struck on the highway in New Zealand, was covered by hundreds of sharp spines, but they didn't offer much protection from the automobile that killed it.

dog that has received a full "shot" in the face will not question the efficiency of the skunk's weapon when it comes to protection. Ages of depending upon its "spray gun" for defense causes the skunk to normally stop when danger approaches, raise its tail, and hold its ground. This works fine when the threat of danger is from most of the animals that also inhabit the skunk's environment. However, such a defensive behavior spells "doom" when the danger is in the form of a car thundering along at 50 miles an hour or more. In such cases there can be only one victor.

The largest number of skunks is killed in the spring and fall. In the fall there is considerable travel in search of "winter quarters", where they will be better protected from the severe winter to come.

In the spring a skunk's fancy, like that of young men and women, turns to amorous things, such as finding a mate and a place in which to bear their young. Such searching often involves considerable travel. Unfortunately, the travel lanes often involve crossing the highway and — splat!

Dead rabbits and other animals on the road also contribute to the high skunk death count. Being carnivores, skunks are attracted to the fresh meat, where they are hit while eating. Eating a meal on a busy highway is **definitely not** a good idea!



The nutria is a large, non-native rodent that was released in the United States some years ago. A fine swimmer and agile animal in the water (note the large, webbed hind feet), it asks for trouble when it crosses the road from one pond to another.



This Australian relative of the American opossum met its fate in the same way as many thousands of our marsupials do here--on the roadway.

OPOSSUM

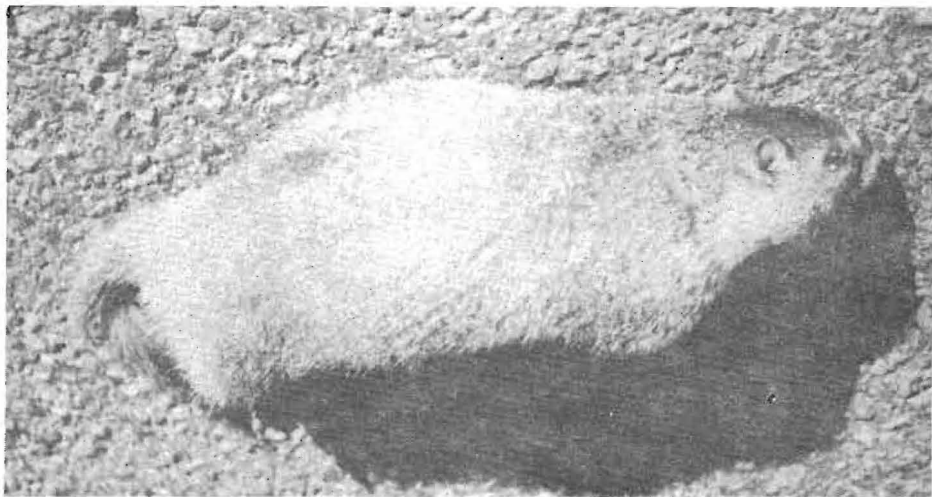
As in the case of the skunk, an instinctive reaction that might otherwise help in survival plays a large part in the high death rate of opossums on the highways.

Most of you are probably familiar with stories of how an opossum usually rolls over and goes into a comatose state when threatened with possible injury. Apparently the opossum doesn't rate very high as a "menu" item with many animals, so, after giving the marsupial a shake or two, they assume it to be dead and go on their way without devouring it. After a time, when the threat of death or further injury is past, the furry creature will slowly rouse itself and amble on its way.

Such behavior has helped the opossum maintain its numbers on Earth for many thousands of years. It is ironic that a behavior that has served it so well through the ages now helps to contribute to its untimely death. To "play 'possum" in front on an approaching car or truck is committing suicide. The great number of dead opossums on our highways attests to its inability to adjust to a very dangerous modern threat to its life.

SQUIRRELS

Many squirrels meet their doom on the highways. Unlike coyotes and hawk kills, which are more common on the larger and more heavily traveled highways, the greatest number of squirrel



Tourists often see marmots perched upon the rocks along highways in the mountains of Colorado. Going across the road to visit a neighbor on the other side may be a one-way trip.

kills is along country roads or in residential areas of cities. This is especially true where the road is lined with trees, such as osage orange, or hedge, trees. In the cities, where the Dutch elm disease has decimated this species of shade tree, many oak trees have been planted as a replacement. The large number of acorns now produced has helped bring about an increase of the squirrel population in urban and suburban areas. Even with a speed limit of 30 miles an hour or less on the city streets, dead squirrels are seen almost every day.

Squirrels are great travelers, crossing and recrossing the roads in search of food, homes, mates,

and to establish and defend their home territories. To paraphrase the warning on a package of cigarettes, "Too much crossing of the road may be hazardous to your health."

As more and more hedgerows and windbreaks are cut and bulldozed, favorable squirrel habitat along roadways decreases, with a subsequent reduction in the squirrels in the area, and fewer road kills in rural areas. Kills on the streets of residential areas may be expected to increase.

CATS AND DOGS

People often used the expression "quick as a cat," or speak of a cat's "nine lives." There is no



The cape dog of Kenya, East Africa, is an efficient and fearless predator upon the large game of the plains, such as the wildebeest, zebras, and gazelles. They don't do so well in an encounter with an automobile.

question that a cat has fast reflexes and is tough to kill. Some people like to claim that they can "lick their weight in wildcats." This speed, toughness, and tenacity to life serves good stead in the cat family's struggle for survival in the wild, but one blow from a speeding car or truck may well claim all nine lives at once; and speedwise, not even the cheetah, which is considered to be the swiftest mammal alive, can outrun a car speeding along at 70 to 80 miles an hour.

Many dogs meet their doom on the highway. Their numbers may well be less than they were years ago when there was a farm house on nearly every quarter section, and nearly every farmer had a dog or two for protection and

companionship. The reduction has not been as great as might be expected, however, due to more people having dogs as pets and more cars traveling at higher speeds upon the highways. Now more of the kills are in the suburbs or in the cities. On a trip through Mexico last year, the writer noted more dead dogs on the roads than any other animal. However, judging from the number of little flower-decked shrines along the highways, humans didn't rank far behind when it came to numbers hit.

COYOTES

Coyotes are swift, wary, and intelligent animals. In spite of a good population, their numbers are not high among road kills. Of



This is not a coyote, but a silver-backed jackal that was killed on the road in Kenya, East Africa.

those that are killed, most meet their demise along wide, high speed roadways, such as turnpikes. The wide spacing between the two pavements may be confusing to the animals, as well as the greater speed and increased numbers of vehicles on the roadway. Coming to feed on the fresh road kills of such animals as rabbits often proves fatal.

Coyotes, like deer, may try to cross the road just behind the lights at night. The writer was riding in an automobile when a large coyote crashed "full steam" into the side of the car. In this case the victim hit the car, not the car the victim. Even so, the

coyote came out second best — his skin and skull are now in the Emporia State University mammalogy collection.

DEER

There are probably more deer in the United States today than there were at the time of Daniel Boone. Deer living at that time were in slight danger from Boone's flintlock rifle or an Indian's arrow. Today they must face a much greater danger.

There are an estimated 150,000 to 200,000 deer killed annually on our highways. The count may actually be much higher. Considering the medical bills for injured passengers,



Australia doesn't have the large game animals (e.g., deer, moose, bears, etc.) that are found in the United States. Instead, motorists must be cautioned not to strike such animals as the large red kangaroo.



Striking a five foot, one-hundred fifty pound kangaroo is not only injurious to its health, but doesn't do the car any good, either

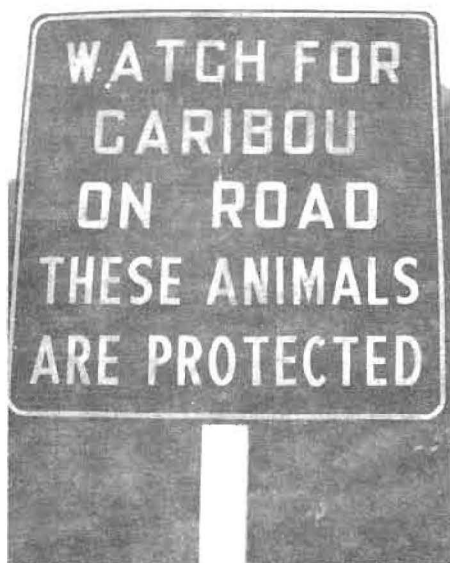
damage to cars, and lost revenue from edible meat and sport

revenue, this represents a monetary loss of between \$250,000,000 and \$500,000,000 every year. One estimate claims that over \$200,000,000 of this could be saved by installing "deer reflectors" at crossing areas, observing "deer crossing" signs, and driving within the speed limit.

Deer tend to cross in greater numbers at specific points ("traveling lanes") along the highways. In many cases warning signs have been erected at such places (see cover picture). If drivers would only slow down and drive defensively through such areas, they would not only reduce the chance of killing a deer, but of incurring serious injury to themselves and extensive damage to their cars.

Should you strike a deer (or be struck by one*) call the nearest game protector. This not only helps them keep more accurate statistics, but also permits the saving of the meat for human consumption in many cases.

*Deer may try to cross the highway just behind the lights of the oncoming car, so that they strike the car broadside. The force of the impact often kills or seriously injures the deer, as well as doing extensive damage to the automobile.



As you go north on the North American continent, deer give way to the caribou. This sign was observed along the highway in Canada.

RACCOONS

The raccoon is an intelligent animal, but has not learned how to determine when it is safe to cross a roadway.

As farms became larger and larger, great numbers of old farm homes and outbuildings were abandoned after the early 30's. Such buildings provided an ideal refuge and home for the raccoon to live in and rear its young. Along with a drop in the price of furs, hunting and trapping pressures decreased, and the raccoon population built up to unprecedented numbers. At the

same time the numbers and speed of cars and trucks also increased. All of the above factors contributed to a great number of these animals being killed upon the highways.

Many of the old farmsteads have been torn down or bulldozed to make more farm land available. Also, fur prices again rose sufficiently to make hunting and trapping attractive as a way to pick up a few extra dollars. Though many raccoons are still killed along the roads, the annual number of kills appears to be slowly decreasing.



We should probably erect more signs such as the one shown above, as many animals other than deer or livestock are in danger from speeding vehicles.



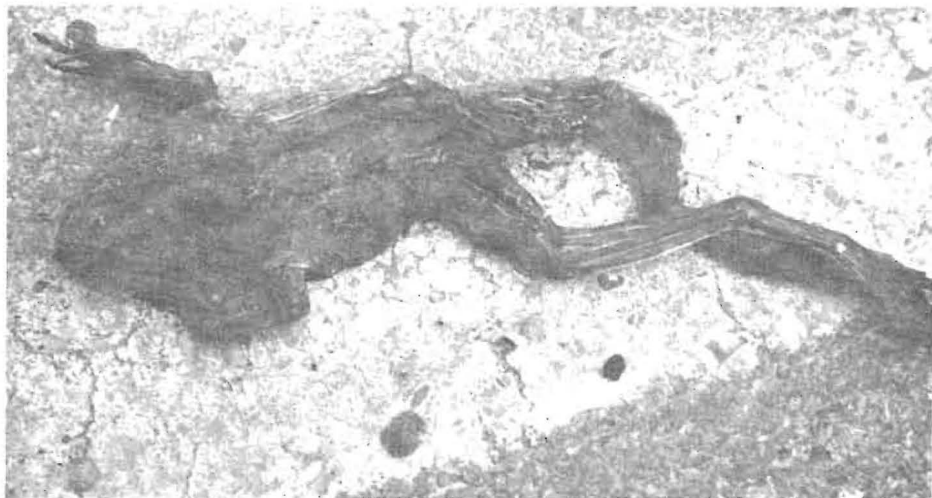
The author was riding behind a car in Australia when it crashed into a flock of parrots that had lit upon the roadway. Many were killed. This picture is of a severely injured individual that no doubt died later from its injuries.

BIRDS

This writer can recall when, as a kid, it was not at all, common to hit a bird on the road with the old Model T Ford or the open Chevy, even though the cars weren't traveling more than 25 to 30 miles an hour. Many farmers kept chickens, and the feathers flew when a car crashed through a flock on the road eating fallen wheat and corn. On the way home from a high school basketball game in the late 30's a hen struck the windshield, and egg-yolk trickled down the glass in front of the driver's face. With

fewer farm houses, and even fewer farmers keeping flocks of chickens or turkeys today, such kills are no longer common.

With more and faster cars, one would expect a greater toll of bird life today. Such has apparently not been the case. Where in the 30's birds often waited until the old touring car was almost upon them before taking flight, they appear to realize instinctively the car's increased rate of speed and take off sooner and are less likely to be hit.



Frogs are great jumpers, unless they make the fatal mistake of jumping in front of an oncoming car.

Even so, many birds are still slaughtered on our highways. Grain-eating birds, such as quail and pheasants, become especially vulnerable when they gather along the roadway to eat spilled grain and pick up grit for their crops. Mother pheasants often bring their broods to feed at such places, and the small chicks, unable to fly, or react as swiftly as adult birds, are crushed by the oncoming traffic.

Hawks, crows, owls, and vultures are far too common victims of the speeding auto. Alighting on the road to feed upon the flesh of a fresh road kill, they are unable to take flight in time to escape a collision with the mechanical killers.

REPTILES

Reptiles are cold-blood, so are seldom included among winter road kills, as they are usually in hibernation. With the appearance of spring, they leave their places of hibernation, and start searching for food, mates, and spring territories. As snakes tend to collect in "dens" for protection from the winter's cold, often in large numbers, many may be killed in a small area as they disperse across the highways upon leaving their winter quarters.

Most of you have no doubt noticed that dark objects tend to absorb heat more readily than light-colored objects, and may



During the cool days of spring and fall, cold-blooded vertebrates, such as this snake, crawl out upon the warm blacktop roadway in order to raise their body temperatures. Many are killed because of this type of behavior.

become warmer than the air and other objects in their surroundings. This is especially true of "blacktop" highways. The dark surface becomes warm in the afternoon, and remains warmer than the atmosphere into the evening. With no fur or feathers to help maintain the snake's body heat as the air cools, they try to compensate by stretching out upon the warm black road surface. Not even a "blue racer" can react fast enough to escape the wheels of an on-rushing vehicle.

Snapping turtles and box turtles are the most common turtle victims on the highway. Snapping turtles are most often hit in the spring and early summer, as they hunt for mates and places to lay their eggs. In times of

drought, especially in late summer, numbers may be crushed on the roads as they leave ponds that are drying up and search for those with a greater water supply.

The natural reaction of the box turtle is to draw within its shell for safety when threatened. This may work if the threat is from a coyote or some other animal, but it is a fatal reaction if the danger is due to a semi-trailer truck—or even a VW "bug".

THE FRIGHTENING NUMBERS

The numbers of vertebrates killed upon our highways is almost unbelievable. Kansas is reported to have some 130,000 miles of maintained roads. If only ten vertebrates (mammals, birds, reptiles, and amphibians) are struck per mile during the entire year, the toll would be over one and a quarter million highway deaths. Ten is probably a very conservative number. Some actual counts, covering only a few weeks, have recorded losses of four to five per mile in some areas. When you estimate numbers of animals struck on the highways of the fifty states each year, the numbers become frightening.

To the above should be added the tens of thousands of deaths and injuries to humans each year. It is not at all uncommon for the prediction to be made of possible 300 to 500 highway fatalities on a holiday weekend.

WHAT CAN YOU DO?

Many of the killings on the highways cannot be avoided. However, there are several things we, as drivers, can do to reduce this tremendous slaughter of our wildlife.

1. Stay within the speed limit. An animal has a better chance of getting out of the way of your car if you are driving at 55 miles an hour or less than if you are going 65 to 70.

2. Observe warning signs. A "deer crossing" sign indicates that you are in an area where there is a greater chance of striking an animal. Slow down and drive defensively. Striking a large animal may not only kill or injure the animal, but it certainly doesn't do your car any good, either. The writer regrets not taking a picture of a sign he saw in

Kenya, South Africa, that most people would probably be very willing to observe: **ELEPHANTS HAVE THE RIGHT OF WAY!**

3. Slow down as dusk approaches. Continue to drive with extra care until it is again daylight. Many animals start being active after the sun goes down, returning to their homes with the approach of daylight hours. This means that with more animals abroad and with the reduced visibility due to darkness, the chance of hitting one is greatly increased. By the time you see an animal on the road in the headlights of your car when driving at 55 miles an hour, it is often too late to avoid striking it. Also, an attempt to swerve at high speeds to avoid a collision with the animal risks a possible accident and serious injury.

4. Slow down when coming over the brow of a hill or when driving on crooked roads, where your view ahead is limited. You can never tell when livestock may have wandered upon the roadway. Hitting a cow, horse, or pig can be a dangerous and expensive event.

5. Keep a record of the number of vertebrates you see killed on the highway for a period

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Emporia State University
1200 Commercial Street
Emporia, Kansas 66801

Entered as Second
Class Mail and
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of several weeks. Write down the mileage at the start of your trip and at the end. Be sure to record the date(s). Identify as many as you can. Record those you cannot as "unknown vertebrates". If you are in a group (e.g., biology class) ask them to keep a similar set of records. Tabulate your data and answer the following questions:

a. What animals are most often struck on the roadways in the area of your study?

b. At what time of the 24-hour day is the greatest number killed - evening, night,

dawn, broad daylight?

c. Did the time of year you made your study have an effect on your results - (e.g., would there have been more reptiles at a different time of the year, etc.?)

6. If at all possible, try to avoid hitting all animals, even those too small to wreck or damage your car. Many people deliberately swerve to hit a snake or turtle. Some even try to hit a rabbit or squirrel when it is on the road. Many road kills could be avoided if we would only respect the rights of animals other than ourselves.