Do Squirrels Matter?

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"The last word in ignorance is the man who says of an animal or plant: "What good is it?"" --Aldo Leopold

Introduction

Humans measure the worth of an animal in a variety of ways. Seen through the prism of human perspective, there may be social, economic, environmental, emotional, and medical worth to an animal. In addition, different individuals, societies, and eras value animals differently. How and where do tree squirrels fit into this evaluation in modern-day America, and is there a consensus on their worth? Strictly from an emotional, even visceral, viewpoint, the camps are divided, sometimes starkly so. Some people enjoy squirrels, some detest them. Others are indifferent. Their worth might therefore seem extraordinarily subjective, to be based on an individual's experience, knowledge, or self-interest. But perhaps the worth of any given animal is better evaluated on a broader scale.

This paper will focus on the tree squirrel, particularly the two most common species found in northeastern Illinois, the Fox squirrel (*Sciurus niger*) (see Figure One) and the Eastern Gray squirrel (*Sciurus carolinensis*) (see Figure Two). I will attempt to determine the current societal value of the tree squirrel and how that value is measured. As previously noted, since an animal's perceived worth can vary by era, a brief historical examination will help put modern-day evaluations of squirrel worth in perspective.

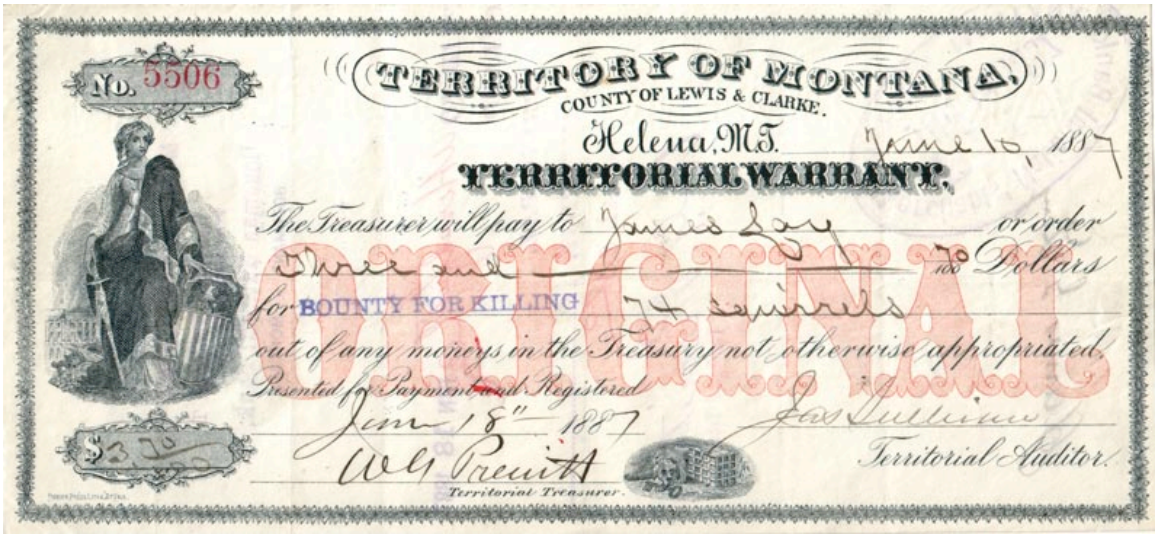
Yesterday

According to William Cronon in Changes in the Land, Native Americans were effective stewards of the land, implementing far-sighted environmental practices such as controlled burnings to help promote both flora and fauna. Keeping food resources (such as oak trees) available through such practices helped keep animal resources (such as squirrels) available. "In effect, the Native Americans were not only providing the soil with fresh nutrients, thus benefiting the entire environment, but they were using the land to continually restock a smorgasbord of plant and animal life for them to consume." (Cronon 50). Cronon contends that European settlers saw this abundance as infinite and did not adopt the Native American's earth-friendly practices to maintain the surplus.

This shift in environmental dominance from Native American to European represented a sea-change in attitudes toward wildlife, from the Indians' reverence for the sanctity of life to the Europeans' general indifference to it. According to Black Elk in The Sacred Pipe, the Oglala Sioux believe that God is within all things. "We should know that all things are the works of the Great Spirit. We should know that He is within all things: the trees, the grasses, the rivers, the mountains, and all the four-legged animals, and the winged peoples; and even more important, we should understand that He is also above these things and peoples." (Harrison)

The European settlers generally also did not fully consider the negative effects of chopping down swaths of forests to build towns and farms, including the reaction by the forest dwellers most directly impacted. "Wild animals that had lived in these forests for centuries suddenly found their homes and food supplies being cut away. But they soon found a new and truly overabundant source of food, and huge numbers invaded these corn and wheat fields during the middle 1700s. Squirrels, for one, became notorious for stealing food from the European settlers' fields. Yet this only occurred after these same settlers stole the trees which had provided the squirrels with food for centuries. This seems an even trade, but like most "even trade" treaties of that day, the European settlers didn't see it that way. In the minds of the settlers, there was no longer room for squirrels in the expansion of Western Civilization. Squirrels became a pest that needed to be exterminated." (Cronon 51).

Such mass exterminations of squirrels were often done on a staggering scale. According to Gerald Carson in his 1972 book Men, Beasts, and Gods: A History of Kindness and Cruelty to Animals, "whole countryside[s] would join in the cooperative hunt known as a 'squirrel frolic', the winner determined by the tail count. The *Kentucky Gazette* for May 17, 1796, printed the total number of squirrels killed in one day's fun: 7,941" (Carson 66). Over the next hundred years many states and counties offered bounties for squirrel pelts, as exemplified in the following image. (Elovich) 74 squirrel pelts were worth $3.70 according to this 1887 treasury note, which amounts to five cents per animal.



Naturalist Ernest Thompson Seton (author of the 1922 children's book Bannertail: The Story of a Gray Squirrel) had strong opinions on the fate of the squirrel. "The greatest enemy of the Gray-Squirrel is undoubtedly the whiteman, armed – not with the rifle, but with an axe. While the great basin of the Mississippi Valley was crowded with nut trees that never failed of a bounteous annual supply, the Squirrel could scoff at the rifleman, be they never such dead-shots. But when the forest itself was laid low, and the possibility of new generations cut off, the Squirrel hordes were like a river whose parent springs were dried up at the source".(Seton 51)

Today

To paraphrase the title of the 1960s protest song, where have all the squirrels gone? Hannah Holmes points out in her book Suburban Safari: A Year on the Lawn that "Nature has never shown much regard for the lines we people draw on maps. Nature goes where Nature can." (Holmes) In this case, squirrels go where squirrels can…or must. According to the Illinois Natural History Survey, "Since 1820, about 69% of the original woodland habitat of Illinois has been removed." (Rosenblatt) That leaves less than a third of the potential wilderness where Illinois squirrels could or did live. To state that without trees there are, or will be, no tree squirrels is fact. But is the inverse true? Will there be trees without the tree squirrel?

The Squirrel – Tree Connection

A 1998 study of oak forest regeneration and the complexities of the squirrels' relationship with such forests was conducted by Michael Steele, associate professor of biology at Wilkes University in Wilkes-Barre, PA and Peter Smallwood, associate professor of biology at the University of Richmond. The study suggests that Gray squirrels can strongly influence the distribution and range of various oak species. “Tree squirrels are one of the most important animals for helping oaks spread, because they store acorns in the ground, practically planting baby oak trees," says Smallwood. (University of Richmond) The researchers note that evidence is accumulating that, along with blue jays and a few other small animals, squirrels are important in maintaining and regenerating second-growth oak forests, and may even have been responsible for spreading the vast stands of oaks throughout North America.

Squirrels are also good indicators of, not just contributors to, the health of a forest. “The presence, demographics, and habitat use of tree squirrels can indicate the status of forested ecosystems”, according to John L. Koprowski. Koprowski goes on to discuss diversity of vegetation equating to diversity of squirrels. “Working on different species in diverse habitats in different regions of North America and Europe, researchers concluded that the most successful approach to conservation of tree squirrels is the promotion of a mosaic landscape.” (Koprowski) Such a mosaic would feature high canopy covers, interlocking canopies, corridors for movement, and fire breaks. As goes the forest, so goes the squirrel.

William Henry Burt in Mammals of the Great Lakes Region agrees with this concept. “Today, in a somewhat more environmentally aware society, squirrels have been recognized as a help to forest conservation because of their curious habit of burying nuts and not remembering where they hid them. There is documented proof that squirrels are largely responsible for the succession of hickory tree forests.” (Burt 102) Author and hunter Leonard Lee Rue takes it a step further and admits that "It would be safe to say…that almost every hickory, butternut, walnut and oak tree growing is the product of some squirrel’s activity years ago" (Rue 278).” Holmes is equally bold by stating that “In

some ecosystems, squirrels are so enmeshed with the reproduction of pines and oaks that without them it's possible the ecosystem could collapse." (Holmes 72)

Even among conservationists, however, the value of squirrels to nature is debatable. In his book Wildlife Conservation in Managed Woodlands and Forests, British forester and author Esmond Harris cites sycamore, maple, beech, and oak bark stripping by Gray squirrels as a reason to eliminate the species. "Late spring damage by bark stripping is more severe where populations are high (often because of winter feeding of game and livestock) and where the habitat has a limited supply of foods to fill the 'hungry gap'" (Harris 204). Harris concludes that "conservation [of the Gray squirrel population] cannot be justified as the Gray squirrel is much the most serious pest of broadleaved trees" and that "poisoning is the most effective means of control available at present" (Harris 204). As a forestry advocate, Harris does not mince words when offering his opinion of the Gray squirrel. According to Dr. Tim Cuttler, who spent an autumn day in 2004 with Harris at his farm in the Tamar Valley of England, "If there was one single message which I came away with from the Tamar Valley on 30th October, it is that no effort should be spared to eliminate the grey squirrel from our country, if we wish to grow trees of any economic importance." (Cuttler)

The Squirrel – Human Connection

If there is no consensus among scientists and naturalists about the importance of the tree squirrel, can we expect any consensus among the general public? How connected are humans to squirrels, and is the degree of connectedness appropriate for each species? According to Richard L. Mallery, squirrels have become our closest (emotionally, not necessarily physically) wildlife connection. However, unless one is trekking through large areas of natural (or semi-natural) habitat such as forests, parks, preserves, or college campuses, humans and squirrels most commonly interface in suburban settings such as homeowner back yards. Some humans love squirrels in their yards and provide them with food and water; some love other animals in their yards (especially birds) and through feeding those animals acquire squirrels; yet others detest squirrels and attempt to rid their property of them. As biophiliacs (lovers of living things) my wife and I fall into the first category, as does Joel Brown, a biologist and nature advocate with the University of Illinois-Chicago. According to Brown, ""Wildlife in one's

backyard is the most intense, most enduring experience of nature than one would ever have". (Babwin) Ralph Waldo Emerson's backyard was forested property in Concord, MA. In exploring the oneness of natural objects and native properties, his squirrel encounters must have been both intense and enduring for him to write, "A squirrel leaping from bough to bough, and making the wood but one wide tree for his pleasure, fills the eye not less than a lion,--is beautiful, self-sufficing, and stands then and there for nature."

The interaction between human and squirrel in one's backyard can vary from indifference on the part of each, to attraction (according to Brown, ""As a general rule, (to squirrels) you are a vending machine," (Babwin), to intolerance, a reaction that would motivate one to try to rid their yard of squirrels however possible, up to and including killing them. Holmes believes that "disregard for humanity is a helpful quality in a mammal who aims to thrive in town. Squirrels have buckets of that disregard. They have to focus all their regard on getting through a year alive, and with their tail intact." (Holmes 70)

Certainly humans seem to be more connected to animals that show a "personality". Do squirrels exhibit personality? Empirical evidence from the author's property indicates yes; there are distinct personalities in the squirrels we observe. Some squirrels are passive, docile, and gentle; others are assertive and boisterous. Some are approachable, others flee. (see Figure Three). But beyond such empiricism, scientists conclude that squirrels do show personality, and that in fact the personality of a mother squirrel is essential for the growth rate and survival of her babies. "Consistent behavior under different circumstances is personality," according to Andrew McAdam, a Michigan State University assistant professor of zoology and of fisheries and wildlife and one of the principal investigators in the Kluane Red Squirrel Project, a collaborative research effort of the University of Alberta, Michigan State University and McGill University. "We recognize personality in people, dogs and cats – some are more aggressive and some are shy. Maybe it shouldn't be so surprising that we see this in wild organisms as well." According to project researchers, Red tree squirrels have a range of personalities from exploratory and aggressive to careful and passive, and squirrels with varying personalities persist in the population because no single personality type offers an exclusive advantage for their own or, in the case of mother squirrels, their offspring's

survival. “There is a range of personalities in squirrels because the personality that is better for fitness depends on the year,” McAdam said. (Michigan State University)

Observing squirrel personalities sometimes, unfortunately, leads to witnessing injury and sickness. Should a human intervene to help an injured squirrel, or should they let “nature take its course”? What is the appropriate level of connection between a human and an injured or ill wild animal? According to Jen, a volunteer at the Willowbrook Wildlife Center, a non-profit wildlife rehabilitation center in Glen Ellyn, IL, 90 percent of the injuries to the wild animals brought to the Center are caused by humans. “Since it was out of the realm of “nature” that caused the injury, there is no letting nature take its course. Nature was already superseded by the human.”

One too-common cause of injury to the Gray squirrel is the unleashed pet. The Project Squirrel Web site concludes that black squirrels are more common in the northern suburbs of Chicago than in other outlying areas due to prevailing leash laws. Loose dogs and cats are more prevalent in the south and west portions of the city and suburbs and, given the Gray squirrel’s lower predator tolerance than the Fox squirrel, fewer Grays, and therefore fewer black morphs, make their home there. (Shepherdson)

However, lax municipal codes are not the only examples of the impact of governmental decisions on squirrel populations. The U.S. Fish and Wildlife Service decided in June 2003 that the Western Gray squirrel does not warrant protection under the Endangered Species Act. Lawsuits by environmental groups in Washington State ensued, citing the destruction of oak woodlands habitat, and therefore the squirrel population, if construction of the proposed multi-lane Cross-Base Highway through south Puget Sound was to be approved. According to a study conducted from 1992 to 1999, the population dropped from 81 breeding pairs to just six in those seven years, and the highway project would eradicate the squirrel population. (Associated Press) The developers prevailed; highway construction began in July 2008.

If the government can’t be depended on to protect squirrels, it may be up to individuals. Yet, a recent (2000) survey does not bode well in this regard. The survey of residents of Northeastern Illinois reveals that there is no clear opinion on squirrels as either curse or blessing. 5,000 homeowners in Cook, DuPage, Kane, Lake and Will counties were

randomly selected for a one-time survey by the Illinois Department of Natural Resources (IDNR). The survey showed that 55 percent of the respondents feed wildlife, and 58 percent had problems with nuisance wildlife. Wildlife causing the most problems were, according to homeowners, geese, raccoons, squirrels, rabbits and skunks. (Allen)

That there may be a correlation between feeding wildlife and subsequent nuisance behavior seems apparent. Humans may be creating their own nuisance by attracting the very animals they later decide have become pests. According to the University of Michigan's Animal Diversity Web site, squirrels are often considered a nuisance species for a number of reasons: raiding of bird feeders, digging up of gardens, damage to corn crops, and gnawing on wooden fences and electrical power lines. There are even occasional reports of overly aggressive tree squirrels attacking people. However, the site shows its non-bias by pointing out the importance of squirrels as a food source, for their fur, and as agents of seed and fungi dispersal. (Fahey)

So, if squirrels have both a positive and negative impact on humans, is the impact equal, or is one greater than the other? The above website fails to mention a significant contribution of squirrels to human health. Perhaps if more people understood the importance of biological diversity and, specifically, the epidemiological benefit that squirrels provide to humans, they would be more tolerant toward them and consider them less of a nuisance.

According to the U.S. National Institutes of Health (NIH), disease risk is influenced by biological diversity, and some host species act to reduce the risk of transmission of virulent zoonotic pathogens (i.e. diseases transmitted between animals and humans). In this case, squirrels (the host species) receive bites from ticks (the vectors (carriers) infected with the spirochete bacteria that cause Lyme disease) that might otherwise bite humans, and thereby break the chain of pathogen transmission. The presence of a relatively inefficient host species has thereby reduced the rate of infectious disease spread into the human host population. According to the NIH, squirrels are poor reservoir species for Lyme disease; fewer than 15% of ticks feeding on Gray squirrels become infected, even though virtually all of the squirrels carry the bacterium. (Dobson) As the rate of infected ticks goes down, the rate of infected people goes down: "It's one

more reason to roll out the welcome mat for…the squirrels and the rest of the furbearers." (Holmes 83)

There is no doubt that there are people who "roll out the welcome mat" and look favorably upon squirrels. Author and poet Diane Ackerman describes squirrel watching as a "front-row seat at one of life's little operas." According to John Gotshall of The Campus Squirrel Listings, the quality of an institution of higher learning can often be determined by the size, health and behavior of the squirrel population on campus. It notes that there is a friendly rivalry between University of California, Berkeley and Stanford University as to which campus is more squirrel-enriched (Berkeley's Grinnell nature area, which is on the south edge of the campus, is known as "squirrel alley", and sitting on the "squirrel log" earns you a visit from the matriculating Fox squirrels, while Stanford's campus and abundant adjacent acreage is a haven for its squirrels.)

Then there are the displays of intolerance of some humans toward squirrels, which I have experienced first hand. In one case the homeowner is a hunter/trapper who seems to have an inordinate fear of wildlife. Another neighbor does not want her garden dug up by nut-burying squirrels. Yet these same individuals maintain multiple bird feeders, decorative water fountains, shrubs, and trees, creating a spa-like experience for wildlife and attracting squirrels like a magnet. According to wildlife ecologist Anthony DeNicola, "It's sad. You set the animal up. You provide an easy food source. The animal habituates. And then you persecute it." (Holmes 84). Mature silver maple trees (*Acer saccharinum*) grow on these properties, and silver maples are known to be attractive to nesting squirrels. According to the Western North Carolina Nature Center, "The buds of silver maple provide a vital link in the food chain of squirrel populations. The early swelling and budburst characteristics of the species come during the critical late winter-spring period when stored food supplies of squirrels are exhausted." (Reichard) (see Figure Four).

This intolerance has spiraled into outright persecution of the Fox and Gray squirrels in our neighborhood. Although protected species, they are nonetheless harassed simply because they exist and do what squirrels do. The hunter/trapper neighbor dislikes squirrels so much that he contacted the IDNR to secure a wildlife nuisance permit (an animal trap cannot be legally set in our village without such a permit). Incredibly, just on

the word of this individual, the biologist at the IDNR responsible for issuing nuisance permits granted him one. The claim was that the squirrels were becoming overly friendly and therefore endangering his three-year-old son. Without any on-site investigation of the claim, the permit was issued by the Springfield office, thereby allowing this person to bait and set a live trap in his yard. My wife and I appealed to the IDNR conservation police as well as the biologist who issued the permit to reconsider their decision and revoke the permit. They never did so, but at the end of the 60-day period the permit was thankfully not renewed. This traumatic episode has taught us that animal trappers have a clever workaround to legal trapping in the suburbs: make a false nuisance claim to the IDNR and obtain a permit. As there is no enforcement to ensure that the permitee follows the requirements (such as that the animal must be released unharmed after it is caught), trappers now have carte blanche to kill wildlife. Who would know or could disprove that the trapped animal was released unharmed?

Even if the animal were to be released unharmed there is great risk that the animal will not survive the relocation, as shown in a three-year study by squirrel expert Van Flyger and colleagues. “During summer and autumn of 1994–1997, we determined the movements and mortality of 38 adult male Eastern grey squirrels (*Sciurus carolinensis*) that had been captured in urban–suburban backyards and translocated to a large forest. The squirrels did not fare well. Squirrels not found dead or classified as 'probable mortality' disappeared from the forest with a median time to disappearance of 11 days. Ninety-seven per cent (37 of 38) of the squirrels either died or disappeared from the release area within 88 days.” (Thorington 129) This outcome should not be surprising, as any relocated animal would be at high risk of predation because it has no established nests, hiding places, or food stores or sources.

The IDNR permit itself fails to set out proper guidelines. For example, it does not address the issue of trapping a lactating female. According to the biologist to whom we protested the permit issuance, permitees are “encouraged” to release such a squirrel to return to its babies, but this is not spelled out in the guidelines. Besides, why would a trapper intent on catching as many “nuisance” squirrels as possible bother to check, or care, that the squirrel in the trap is a nursing mother?

My wife and I are not the only ones with a dim view of the animal-unfriendly attitudes of the natural resources agencies. According to Mallery, “Squirrels get little protection even from wildlife managers sworn to protect them. I have always found it odd that authorities will permit a homeowner to shoot a supposedly nuisance squirrel at the drop of a hat, but then bust a homeowner who has taken in an orphaned baby squirrel to raise."

Tomorrow

To paraphrase the informal “Harvard Law of Animal Behavior”, under the best controlled experimental conditions an animal will do whatever it wants. “Squirrels in the wild seem well acquainted with this law! They opportunistically exploit their environment, in the trees, on the ground, irrespective of how we categorize them.” (Thorington 9) (see Figure Five).

However, no animal can exploit its environment if there is no animal in the environment to exploit. Fox and Gray squirrels of Northeastern Illinois and other portions of the country have not been, and are not currently, classified as endangered. In 1994 hunters in New York State reported killing 577,211 squirrels during a six-month hunting season, which is not far off the previously cited 7,000 killed in one day in Kentucky 200 years ago. (Ackerman). However, if the attitudes of the wildlife agencies and the two homeowners discussed above prevail, the species could reach that status. If the squirrel is gone, and the forest follows, what follows that?

Wildlife ecologist Aldo Leopold wrote poetically of this interconnection:

> Conservation is a state of harmony between men and land. By land is meant all of the things on, over, or in the earth. Harmony with land is like harmony with a friend; you cannot cherish his right hand and chop off his left. That is to say, you cannot love game and hate predators; you cannot conserve the waters and waste the ranges; you cannot build the forest and mine the farm. The land is one organism. Its parts, like our own parts, compete with each other and co-operate with each other. The competitions are as much a part of the inner workings as the co-operations. You can regulate them—cautiously—but not abolish them.

> The outstanding scientific discovery of the twentieth century is not television, or radio, but rather the complexity of the land organism. Only those who know the most about it can appreciate how little we know about it. The last word in ignorance is the man who says of an animal or plant: "What good is it?" If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering. (Leopold 145)

Thorington admits to being asked why squirrels are important, and in reply, “we scarcely know where to start. We have an impressive list of answers to present them”. It includes squirrels as prey items and as ecosystem engineers (playing a significant role in the regeneration of forests around the world as agents of dispersal). “Squirrels are considered key dispersers of at least nine genera of nut bearing trees (Juglans, Carya, Corylus, Fagus, castanea, Castanopsis, Lithocarpus, Quercus, Aesculus) and at least one species of conifer (Pinus koraiensis)” .(Thorington 119)

In the fable The Mountain and the Squirrel, Emerson had his own way of stating the importance of squirrels, and indeed, all of nature, as interpreted in Wheeler’s Graded Literary Readers: “…each thing, whether it be a small raindrop or the great ocean, has its own work to do, and that if it does it well, it has done its part, and that each can do things that the other cannot do.” (Crane)

Do squirrels matter? The answer, simply put, is that yes, squirrels matter, because nature matters. The importance of the connection between squirrels and nature is undeniable, and respecting the squirrel, as respecting all living organisms, is the right thing to do. Aldo Leopold defines “right” in this context: “A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise.”

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Figures Cited

(all photographs taken in Woodridge IL at home of writer)

Figure One

Fox squirrel (Sciurus niger) assuming gargoyle position atop fence post. This is a common position in which squirrel often freezes as if pondering.

Figure Two

Eastern Gray squirrel (*Sciurus carolinensis*) atop wooden fence. Typical species coloration is shown here, although the pronounced brownish tint on head and paws is less common, leading the writer to name this squirrel “Different”.

Figure Three

Docile fox squirrel accepting pecan from writer. “Sweetcheeks” was nursed back to health after suffering from severe mange last winter. Tree squirrels inhabiting abandoned bird nests often become infected with mites that cause the condition.

Figure Four

Fox squirrel descending trunk of mature Silver Maple (*Acer saccharinum*) in early spring. Squirrel exhibits “yoga” behavior, which typically occurs upon awakening from a nap or a night’s sleep. As with humans and other animals, the stretching helps to loosen stiff muscles.

Figure Five

Eastern Gray squirrel taking advantage of backyard cedar deck to engage in prostrate behavior. This process of “going flat” is done frequently in hot weather to cool the underbelly and thereby lower the body temperature.