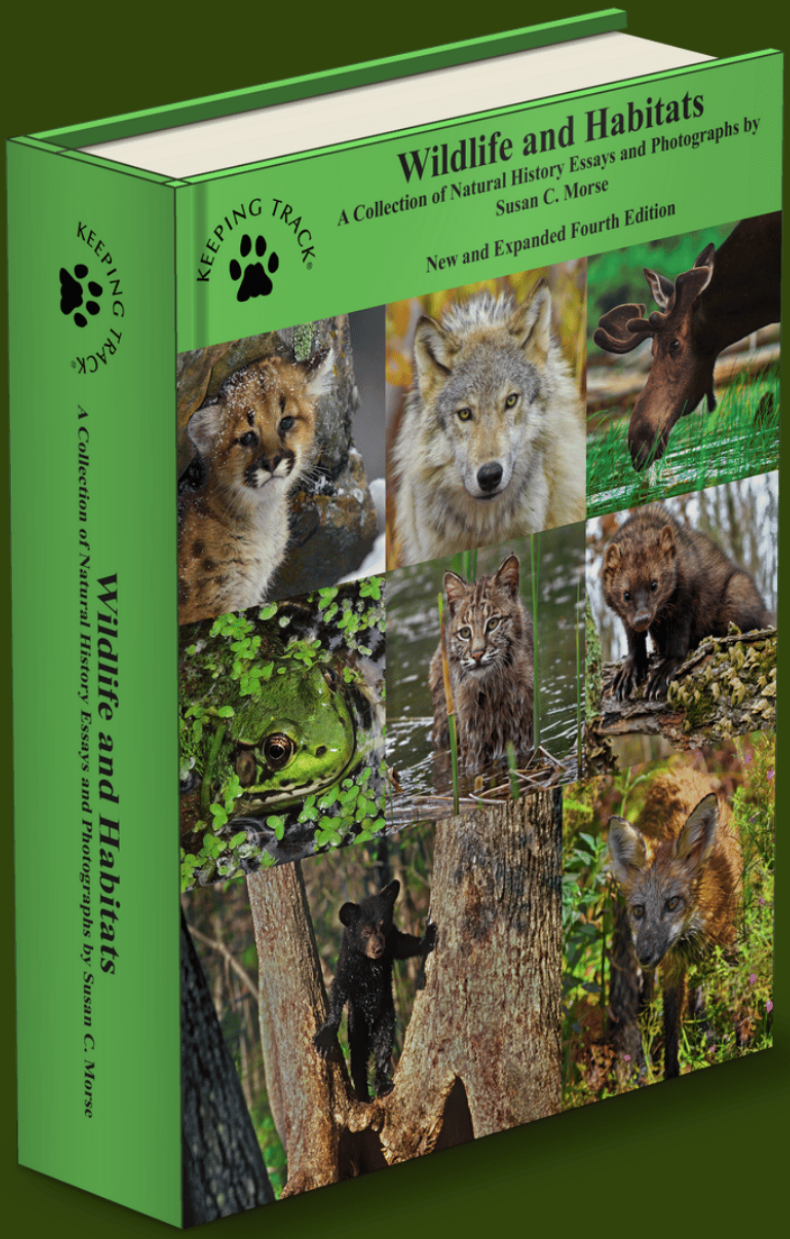
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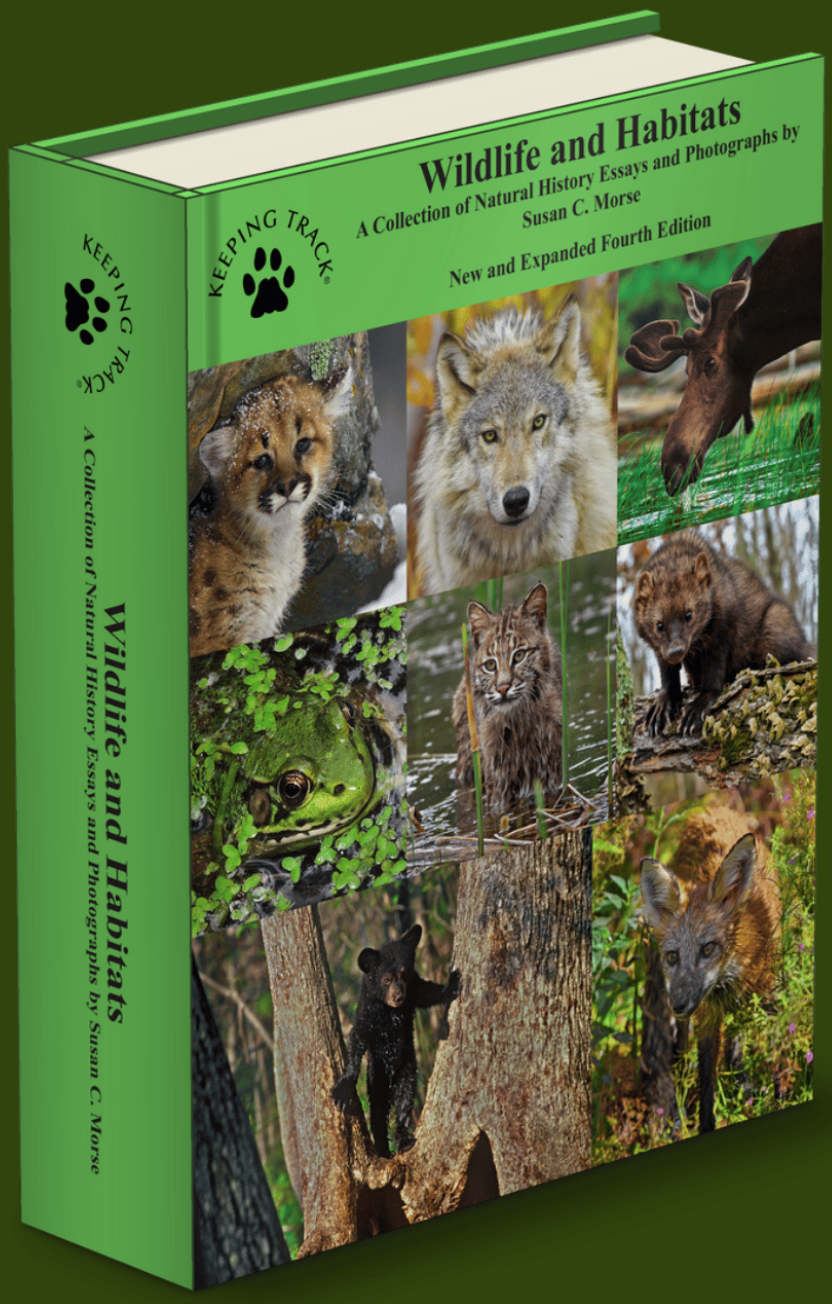
Fourth Edition



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Sample Essays



Portions of this article first appeared in in the Winter
2017 issue of Northern Woodlands Magazine

Making Sense of Scent Marking

Story and Photographs by Susan C. Morse



What do deer, moose, cougars, bobcats, lynx and bears have in common? They communicate with others of their species through "scent-marking." In fact, nearly all terrestrial mammals from mice to elephants use "semiochemicals" so that they may olfactorily communicate with each other in absentia. Semiochemicals is from the Greek word *semeion,* meaning "signal" or "sign."

Carnivore and cervid species maintain social order through an elaborate repertoire of chemo-communications which are continually posted throughout the habitat and refreshed as needed. Urine, feces, saliva and exudates from various skin glands are deposited in specific scent marking environments which are often visually conspicuous and thereby attract olfactory inspection by neighbors and newcomers alike.

Scent marks, posted across a solitary wide-ranging carnivore's expansive home range area, makes possible necessary communication in an energetically efficient manner. Through scent marking, bobcats, cougars, or bears can exploit the resources of huge territories yet remain in near constant contact with others of their kind. Scent messages distributed throughout the shared environment mediate competition and aggressive encounters, while enabling breeding partners to locate one another at other times.











(A) Making a scrape by scuffing with the hind feet

(B) Facial marking with scent from submandibular glands located beneath the chin.

(C) Female inspects urine posted by tom seeking a date.

(D) Remote camera picture of a tom bobcat at Wolfrun facial marking a conspicuous portion of the ledge that hangs down.

(E) Closeup view of hairs that were left where he rubbed.

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Bobcat retromingent spraying a clumped birch

Just a fine mist – mere droplets of urine upon a suitable in-your-face object on the trail – this is but one of several ways in which a Canada lynx or bobcat delivers a powerful long-lasting scent message. "Retromingent spraying" is familiar to anyone who's observed an un-neutered tom housecat backward spraying the barn door or car tire. Curiously, for domestic cats, lynxes and bobcats alike, the "tom cat odor" actually gets stronger with a little time – hence its communicative value. Researchers have discovered that sulphur-based amino acid called "felinine" increases its odor-causing properties with the microbial and oxidative breakdown of its chemical contents. Our Keeping Track students have joined me in sniffing a certain tom bobcat's spray mark for nearly a month before our noses could no longer pick up the felinine scent. Rotten stumps, the undersides of elevated logs, or a cliff wall beneath a rock overhang are preferred spraying locations because the urine scent message is better absorbed, protected from the elements and delivered over time. Combine just one urine spray scent post with dozens of similar spritzes over the course of a randy tom lynx or bobcat's sauntering search and you will appreciate that this behavior is the mate seeking season's *piss de resistance*!



Without a snow pack for increased track detection, the "scrape" is the most frequently found wild felid sign. Scrapes are most likely to be found along ridgelines, at intersecting game trails or in the immediate vicinity of cliff habitats where my research has demonstrated bobcats locate one another and court during the breeding season. A bobcat's hind feet push back dirt, pine needles, sand or leaves into a slight mound, upon which the felid will urinate and sometimes defecate. A bobcat's scrape appears as a shallow rectangular trough roughly four to 5 and 1/2 inches wide. The scrape's scuffed materials culminate in a small pile. This is both visually conspicuous and olfactorily useful as the materials both absorb and elevate the scent. In addition to urine, secretions from interdigital glands on the paws add to the mark's scent contents.



Catherine Morris of Quebec studies fresh scrape on Bobby Knob. Note feces on scrape.

A horizontal log or upright tree stem also serves as a selected medium for the bobcat or lynx's scent secretions exuded from interdigital glands. Picture the wild cat crouched atop a log, in position to grasp and rake it with repeated backward pulling motions of the forelimbs. In addition to stropping the wood with its claws and thereby removing pieces of the claws' worn keratin, the functional purpose of **claw raking** is to scent mark. No matter how intently the felid works at shredding the wood he or she is just as pre-occupied with continually sniff - checking the roughened surface – thereby verifying the presence of the scent mark. The claw shredded wood is not only visually conspicuous; its absorbent surface collects the cat's pedal scent and posts it for other cats' olfactory inspection.



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Whitetail deer use scent marking to maintain a given herd's complex social organization. Each deer's chemo-communications convey its identity, social status and dominance ranking within the herd. Researchers have concluded that semiochemicals posted on rubs and scrapes serve to "prime" and valuably synchronize the onset of estrus in does. Other scent signals are believed to suppress the reproductive urges of subordinate bucks.



Shredded wood embedded in antler pearlations

Researchers Larry Marchington, Karl Miller and colleagues of the University of Georgia documented that a mature whitetail buck makes an average of 2 to 3 rubs per day for a period of four months. Knobby pearlations at the bases of his antlers combine with sharp pointed antlers and powerful neck muscles to reduce a 4 inch diameter ash trunk to shreds. Brightly colored exposed xylem and abraded wood and bark surfaces call attention to the rub; but the real purpose is to prompt olfactory inspection of the scent messages which are posted there. While making a rub a buck will repeatedly press his nose to the tree and sniff the surface he has debarked and scored with his antlers and rubbed with his forehead. His forehead's skin glands smear his unique chemical signature on the tree. Ash, cherry and willow species as well as balsam fir, elderberry and speckled alder are among the preferred rub species in the northeast.



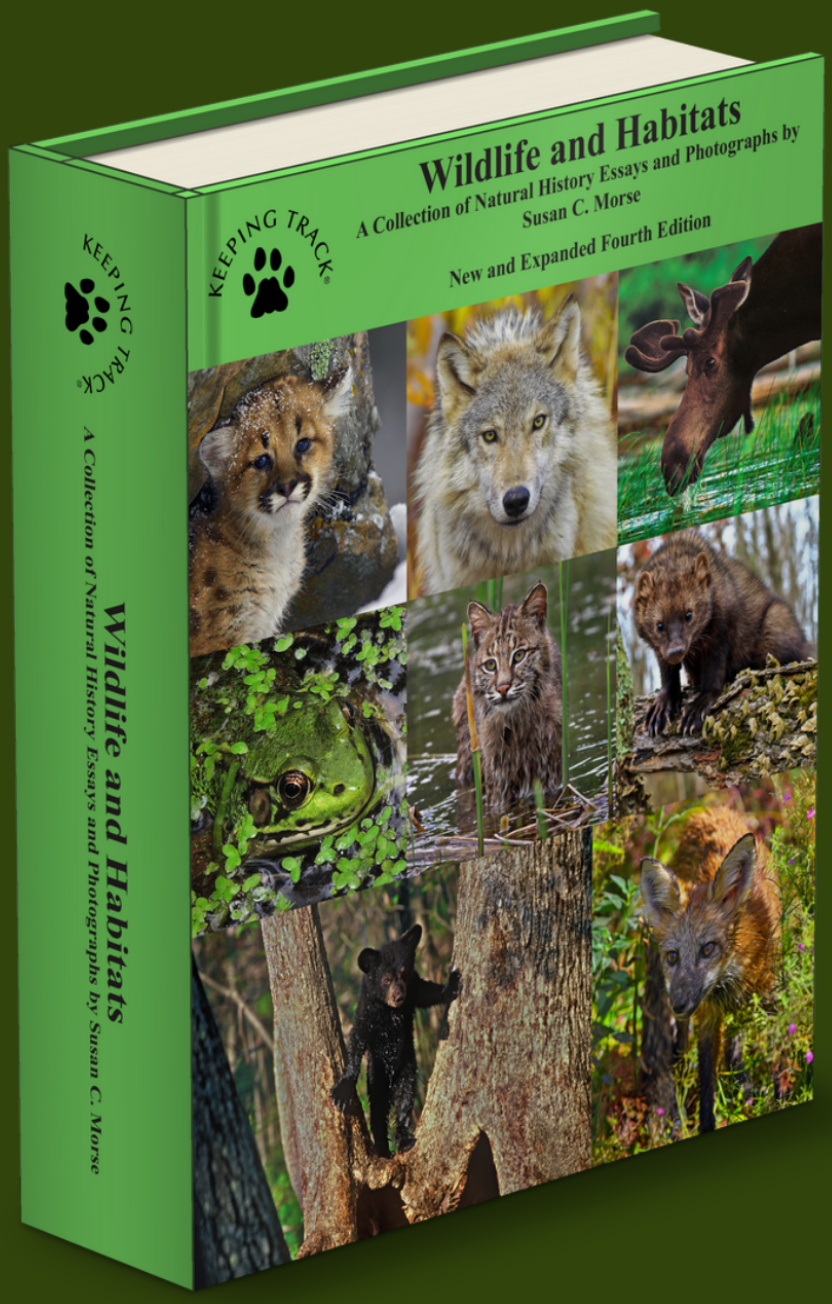


This doe (*left*) is in the process of tasting the scent left by the buck on his rub. Non-volatile scent molecules can then be transferred by her tongue to the vomeronasal organ located on the roof of her mouth. The buck's chemical signals are then pumped to the hypothalamus, a specialized part of the brain that regulates hormones and influences reproductive readiness.

This dandy buck, shown above, has just made her a rub!

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Red fox


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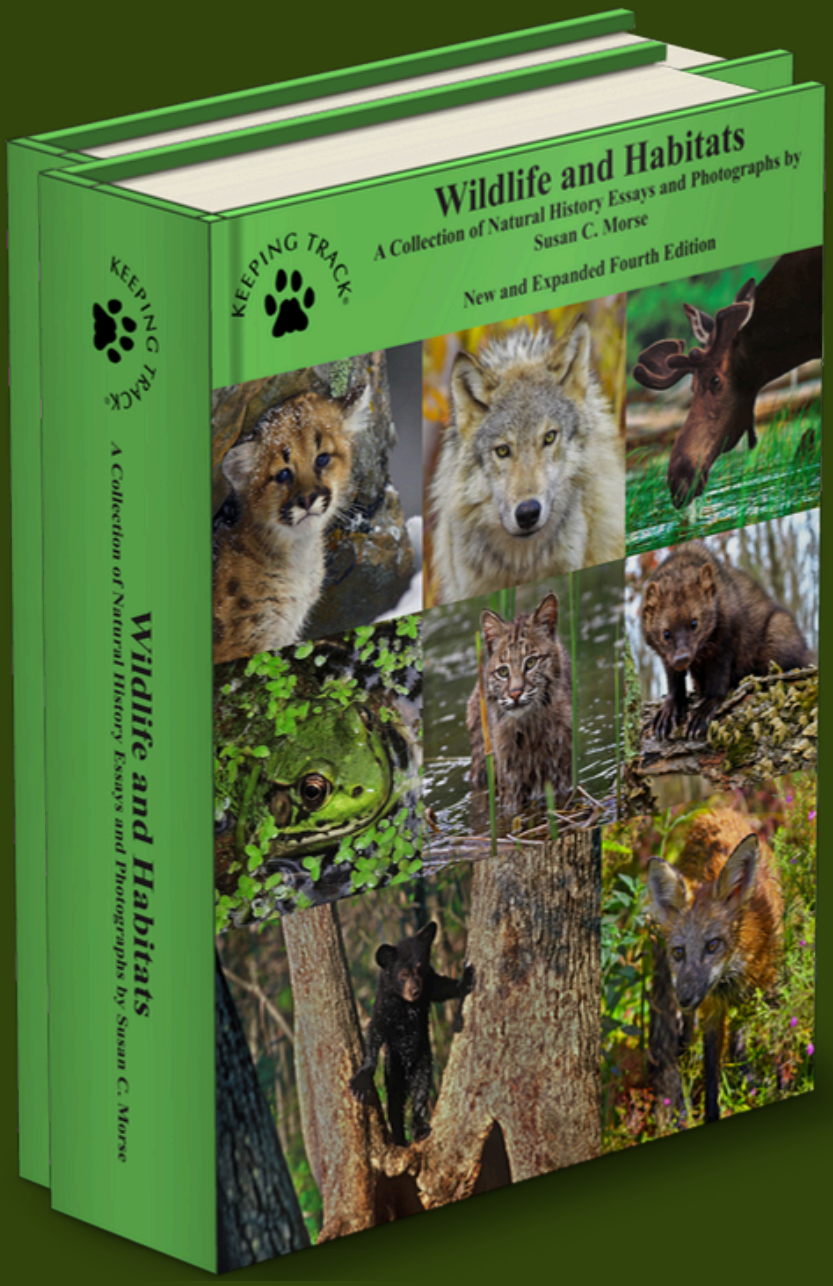
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More Sample Essays



Portions of this article first appeared in the Summer 2024 issue of Northern Woodlands Magazine

Finding the Missing Moose

Story and Photos by Susan C. Morse

Twenty-five years ago, I was planting trees on a suburban property above Shelburne Point in Vermont when I suddenly came face-to-face with a skittish young bull moose. He curiously looked me over for a minute, then whirled away and trotted to the shore of Lake Champlain. He didn't hesitate. He jumped into the water and started swimming. When I lost sight of him far across the lake, he was well on his way toward the Adirondacks.

Moose populations in the Northeast were unnaturally dense back then, and have since declined substantially. Although you're less likely now to encounter a moose wandering through a suburban landscape, you can still find them in prime summer habitat. These areas offer opportunities for cooling, concealment cover and relief from insects, and most important, provide moose with access to abundant food biomass. In summer, moose consume approximately twice as much as they do in winter—up to 45 pounds of leaves, stems, buds, flowers, and other new growth. Weight gain, stored fat, mineral nutrients, and protein are "banked" for winter's period of negative energy balance.



The moose summer diet includes dozens of species of lush forbs, as well as new leaves of woody trees and shrubs. Moose, like this handsome mature cow, spend hours immersed in wetland habitats eating the submerged stems, leaves, and rhizomes of numerous aquatic plants. These plants provide an important source of microelements, including sodium, potassium, phosphorus, and calcium, as well as crude protein. Among a moose's preferred northeastern wetland forage plants are: pondweed, common marsh marigold, water shield, yellow pond lily, fragrant water lily, and arrowhead.



Moose are still shedding their winter coats in early summer, and if you look closely in areas where you suspect they've been walking, you may notice long, coarse guard hairs and fine undercoat hairs snagged on wood. In this photo, high school students inspect hairs that a mature bull left as it ducked under a snag. The students, from Guangzhou, China, were participating in GREEN ACROSS THE WORLD®, a cultural and environmental exchange program based in Vermont.

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Moose calves are the fastest-growing infants of all terrestrial mammals in North America, gaining an average of 1 to 2 pounds per day during their first month, and 3 to 5 pounds thereafter. After consuming approximately a half-gallon of its mother's rich milk each day for the first 3 to 4 weeks, a calf will gradually begin to sample some tender plant foods. Just as gradually, beneficial bacterial fauna will develop within the calf's digestive system. Some of the bacterial organisms may be picked up through direct oral contact with the mother's saliva, or indirectly, as a calf ingests plant parts that the cow has partially browsed. Calves may also "seed" their gut with bacteria by eating fecal matter (*left, bottom*) deposited by the mother and possibly other moose.

A calf's Autumn weight may be between 300 and 400 pounds, with its potential weight as a healthy yearling closer to 500 to 600 pounds. In our region, cows give birth within thick, young conifer stands next to wetlands where they are feeding. The few birthing areas I have studied were situated near wetland edges, but on elevated terrain that probably enhanced the cow's ability to detect enemies. To avoid disturbing the cow and calf, no attempt should be made to look for birthing sites until well after they've been abandoned. Usually by midsummer it is safe to scout for this sign, which includes tracks, scat, and the worn-looking and flattened appearance of vegetation and ground where the birthing and nursing occurred. While on a diet of wetland plants in the summer, moose scat is loose, like dairy cows', and less inclined to form pellets.

"If you want to find the missing moose, find the food."

Find where willow and poplar species grow, and look there. New and old browse and brooming sign will be there if moose are present. The following pages illustrate the appearance of moose feeding sign in different seasons. Across North America, willow species are a nutritious mainstay for moose in spring and summer.



Left: **"Scat is loose" in spring and summer. Forbs and wetland plants can cause fecal matter to look more like that of a dairy cow.**



Left: **Autumn and winter's woody browse results in feces that look like they're full of sawdust and are formed into larger and smaller pellets.**

Right: **New and old browse sign on willow species is a sure way to find the missing moose.**



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A, B: **Flood plain habitats, such as this riparian area in Wyoming, provide hungry moose with abundant willow forage. Many willows are easily identified because their bud arrangement is "appressed" with buds lying close or flat against the stem (see *inset*).**

***C, D*: You're certain to find moose sign in habitats where willow species proliferate. There are dozens of individual and hybrid species of willows that grow in the Northeast, and collectively, they're some of the moose's favorite summer forage plants. Tender, new leaves and budding stems provide a moose with higher amounts of protein and vitamins than all other woody plants. To identify browsed twigs, look for rough-edged stems. Moose lack upper incisors and can only partially cut twigs with the sharp, pointed edges of cusps that rise above the grinding surface of each premolar tooth. The ragged appearance of the bitten portion shows that moose must sometimes crush and partially tear away the desired bud or stem.**





***E, F*: To browse shrubs and trees with out-of-reach branches, moose will break or bend their trunks by straddling them. These toppled "walkovers" allow moose to browse the nutritious topmost tissues of maple, willow, white birch, pin cherry, balsam fir, and hemlock. To confirm that a broken tree is a "walkover," inspect the broken branches and browsed twigs. Notice also the presence of moose hairs on these Hemlock (*E*) and Green Alder (*F*) specimens.**

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Early Spring in the Rocky Mountain west is still snowbound. If you want to find the moose, find the food. *Top*, two moose are browsing among extensive willow growth along Wyoming's Gardiner River. *Above left,* moose trails show that they are seeking food among abundant willows growing in a riparian flood plain. *Above center and right,* moose in western habitats strip bark from Quaking Aspen trees. Photo on the right shows new and old bark stripping scars.

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Left: **Old moose barking sign on aspen becomes very corrugated-looking as it ages and the tree's trunk expands. Incisor scraping scars can be seen above the snow line and to the height of a moose's reach. Where this happens, that section of the tree's bark tends to look more like an oak than an aspen.**

Above**: These Wyoming aspens show a history of being foraged. In addition, we see new incisor marks, showing us that this grove is still attractive to moose.**

Below**: This stand of aspen in Montana is full of historic moose barking sign. Aspen bark is rich in carbohydrates, proteins and minerals, and can provide food even before the leaves are formed.**



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"If you want to find moose in summer, look in wetlands"



Bulls and cows alike are great swimmers. They have been observed to dive nearly 18 feet underwater, turn their bodies around, and remain foraging underwater for a half-minute or more. When a moose suddenly surfaces, its expressive rolling eyes, cascades of water draining from pendulous ears and bulbous nose make for a particularly fun and photogenic experience.

In addition to meeting other caloric demands, bull moose must also fuel the production of antlers. A mature bull such as the one pictured above is able to produce a 50-pound rack in just 150 days. During a peak growth period, his antlers can lengthen by as much as three-quarters of an inch per day. Cows (*right*) enjoy nutritious forage in the wetlands as well. A mature cow that can eat well and gain weight will be better prepared to ovulate, conceive, and support next year's healthy calves.

Moose have been seen swimming Icy Strait in Alaska, including a moose that was killed and consumed by a killer whale! In the early 1900s, moose may have reached Isle Royale by swimming across Lake Superior from Minnesota. Their major predator, the gray wolf, probably walked across the frozen lake from Ontario in the late 1940s.



Moose are great swimmers. In summer, they seek wetlands not only for abundant, nutritious food, but for relief from insects and heat.

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Portions of this article first appeared in the
Summer 2004 issue of Northern Woodlands
Magazine

Hidden Treasures

Story and Photographs by Susan C. Morse



Infant fawns in the "hider phase" remain motionless and hidden in herbaceous cover. During this early period, they can be vulnerable to predators, including black bear, bobcat, coyote, fisher and occasional birds of prey.

The luminous green of grasses and forbs in late spring and early summer never fails to remind me of an especially memorable moment with my grandfather, Norman K. Morse, a naturalist, landscaper and farmer. He was part-way through a first-cut haying when he stopped his tractor and came to retrieve me. "I have something really special for you to see, but you must not make a sound," he said, as we snuck along the woodland edge beside the hayfield.

There, flat to the ground, a centerpiece in the highest grass, lay a days-old fawn. The only movement was a flaring of nostrils as the animal breathed. Its spotted coloration visually broke up its outline, further concealing the tiny deer from predators.

My grandfather had observed an anxious doe race along the edge of the meadow as he neared where the hidden fawn was sequestered. A wise doe will even place her newborn twins in separate bed sites - as much as 100 yards apart - to preclude the loss of both should a predator discover one. The doe's only contact with her fawns is to nurse and groom them two to three times each day. Nutritious and digestible forbs nearby (including alfalfa and clover farm crops) assure adequate milk and the fawns' necessary and rapid growth. Weighing 6 to 10 pounds at birth, a fawn may triple its weight in a month, and, amazingly, is able to outrun predators in even less time.

By early July, the observant tracker will find the minuscule tracks and scats of some fawns. Both will be less than half the size of adult deer's. Rarely, we find evidence of predation.



Infant fawn track.

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Once, while afield with some Vermont Youth Corps volunteers, we had quietly paused for lunch on a breezy softwood bench overlooking a beaver pond. Suddenly, a heart-wrenching bleating and bawling arose from the grassy cover. Then it abruptly ceased, presumably as the predator killed the fawn.



The next day, I inspected the area and found tracks in the nearby mud and the remains of a carcass. A bear had successfully secured a meal. Sometimes, trackers can discern patterns in tall vegetation such as trampled pathways, demonstrating a bear's zigging and zagging, back-and-forth deliberate searching for hiding fawns. As diligently as the doe conceals her fawn, some bears have learned that a deliberate search often yields much-needed, protein-rich nutrition. For a sow who has young of her own, this is nature's plan.



1. The doe will nurse and care for her hidden treasure two or three times daily

2. hider fawn in the woods

3. hider fawn in a meadow;

4. young fawn up and foraging on jewelweed – it is now strong enough to follow its mother and outrun predators.







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About the Author



Susan C. Morse is widely regarded as an expert in natural history and one of North America's leading wildlife trackers. For over 50 years, she has gone deep into the field to monitor wildlife, documenting the presence and habitat requirements of such elusive species as bobcat, black bear, Canada lynx, caribou, and cougar. She is also the founder and science director of Keeping Track, a non-profit dedicated to engaging the public in studying and documenting local wildlife so that it might be more readily conserved.

An accomplished writer and photographer, Sue has authored four editions of *Wildlife and Habitats* as well *as A Guide to Recognizing the Florida Panther, Its Tracks and Sign*. She also wrote and illustrated well over 100 articles for *Northern Woodlands* magazine during a 30-year tenure with the publication.

Sue's honors include the Environmental Leader Award from Unity College and the Franklin Fairbanks Award for enriching New England residents' understanding of the natural world. The Adirondack Council has recognized both Sue and Keeping Track for decades of conservation work in the Lake Champlain basin bioregion. She has also been featured on NPR and in *Adirondack Life*, *Audubon*, and *Smithsonian* magazines. She lives in Jericho, Vermont, tending to a rich and diverse forest that she helped conserve.

Praise for Her Work

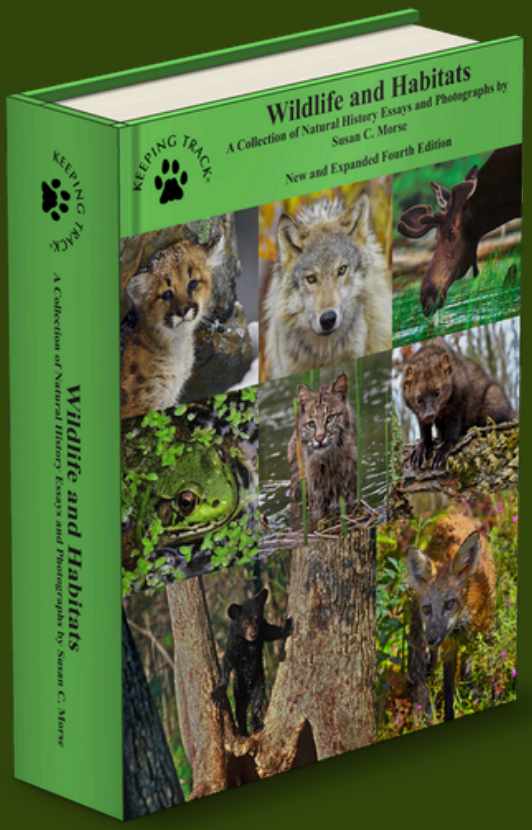
"Sue Morse is one of the most capable and experienced naturalists in the United States."
Harley Shaw, mountain lion biologist, former editor of *The Wild Feline Monitor*.

"The way Sue is able to transport you into her world of bobcats, bear, coyote and other friends is nothing short of magic…. their world comes to life."
Steven J. Holmes, Sustainable Communities Program Director,
Vermont Natural Resources Council

"[Sue's] beautiful photographs capture the spirit of these animals, and the accompanying words offer glimpses into their lives."
Eric Sorenson, co-author of *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*

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Brick Moltz, former Director of Education at
The Fells (John Hay Estate), Newbury, NH

"I recommend this book to anyone who wants to become better acquainted with our wild neighbors. Morse's exquisite photographs help readers more fully appreciate her written observations, drawn from nearly five decades of field studies."
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