Whitetail habitats and ranges

Some white-tailed deer inhabit a tiny pocket of land—just a patch of wood bordering a bit of overgrown field left by the subdivision developer. Other deer may range over an extensive area, inhabiting one site in summer and another in winter and traveling between them in spring and fall. A host of factors figure in the difference, from geographic and environmental (elevation, climate, food, habitat, and season) to the deer themselves (sex, size, age, and number)—all of which make it difficult to generalize about this protean species. But generally, the radius of a whitetail's home range is only slightly more than a mile.

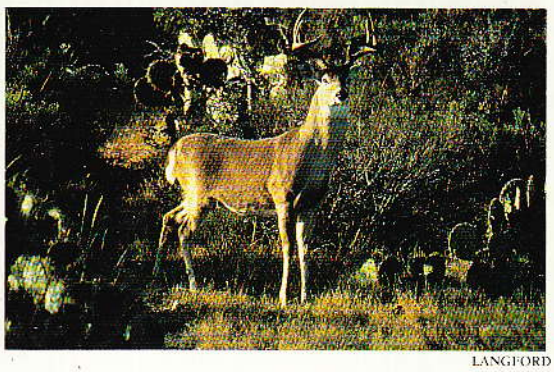
In the snowbelt region, where weather is harsh, annual home ranges average larger, generally 11 square miles, than in the milder climates of the South, where deer rarely move more than 1½ to 2 square miles, for the simple reason that deer in the inhospitable North need more territory in which to meet their needs.

The density of vegetation also affects the size of a deer's home range. In open habitats, such as prairies and open forest stands, home ranges are larger than in heavily wooded areas. As the herd increases in number, home range decreases in size.

Season, age, and sex have a bearing, too. In a Georgia study, adult bucks approximately doubled their home ranges during the rut. In Minnesota, yearlings and young adults seemed to have larger ranges than older animals. In Minnesota, Texas, Missouri, and Florida, adult bucks had home ranges that were, on average, twice the size of adult does' ranges.

Home ranges are most commonly elongated. The long oval is more efficient than a circle because it allows the deer to sample a variety of habitat types—field, edge, wood, and streamside—within a small area and thus seek cover and find food and water with less effort. Elongated home ranges, however, are less common in habitats with just one or two types of vegetation: here, access to different kinds of food and cover isn't possible anyway, so home ranges assume a more circular shape.

The whitetail's fidelity to home range is well known—deer tend to use the same area year after year regardless of its condition. Deer do move in response to flooding, which is a common occurrence in the Everglades and southern river swamps, but food is not a consideration. In fact, when malnourished deer in poor range are moved to an area with plentiful food, they return to



LANGFORD

Some Texas whitetail habitats are subject to withering drought, and the resident deer must range across larger areas to meet their needs for food and water.

the place where they were captured. Nevertheless, there are circumstances in which deer move to new range, outside of moving to high ground during floods and shifting between winter and summer quarters. The impetus is social pressure.

A young animal's first home range roughly corresponds to that of its mother. During the rut, mature bucks drive away fawn bucks, prompting them to disperse in search of new territories; dispersal is most intense for yearling bucks, too, just before and during the rut. Adult does drive away their yearlings during the birthing period, and dispersal is most intense for young does during the fawning period.

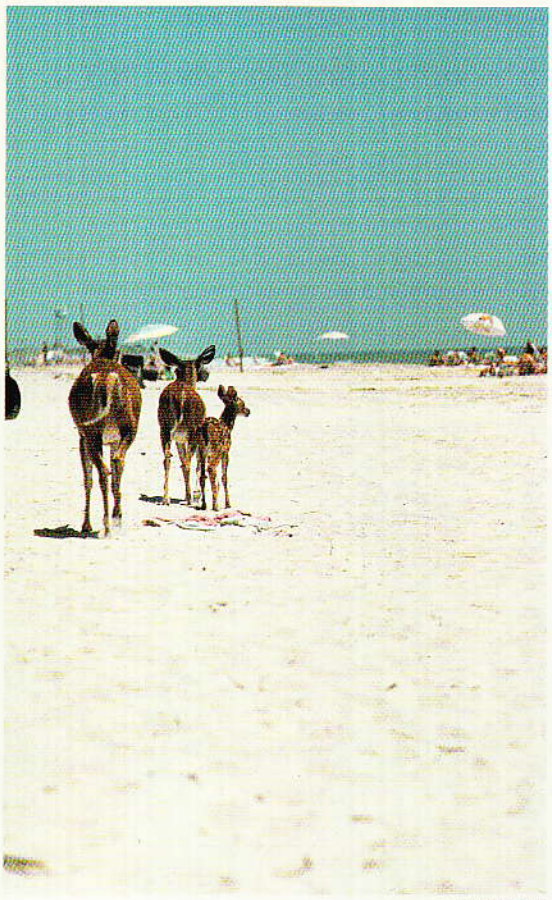
Ranging by Season

Some deer do not have a fixed summer or winter range; instead, they remain in an area until either the habitat disappears or constant harassment affects their ability to survive there. Some whitetails maintain two residences because good summer habitat is not necessarily a good place to be in winter.

Seasonal shifts between summer and winter ranges vary geographically, with deer in the northern and mountainous regions traveling greater distances than deer in milder regions. Deer are pushed into winter range by the arrival of cold weather; when they return to summer range, they are responding to the pull of fresh spring forage. The average seasonal range distances traveled, figured as the mean of the mileage reported in five studies, was 14.3 kilometers (8.9 miles), and the average maximum range distance was 37.3 kilometers (23.2 miles).

In the snowbelt region, whitetails during winter concentrate in yarding areas, which amount to only about 10 to 20 percent of their normal range. In low terrain, deer wintering grounds are adjacent to watercourses. Primary cover species, needed to provide shelter from the heavy snows and cold winds of the Adirondacks, include red spruce, balsam fir, white cedar, and hemlock. Because northern white cedar and hemlock are preferred foods, they are quickly browsed out of reach.

Overwintering areas vary in size, depending on the amount of adjacent wet areas—streams, marshes, swamps—and the length and breadth of stands of mature, uncut conifers. Those evergreens provide essential cover, but food is necessary, too: A good wintering yard provides nearby supplies of black cherry, witch hobble, red maple, striped maple, sugar maple, blueberry, viburnums, and dogwood to browse, along with northern white cedar and hemlock. Such browse plants sprout where hardwood stands undergo periodic cutting.

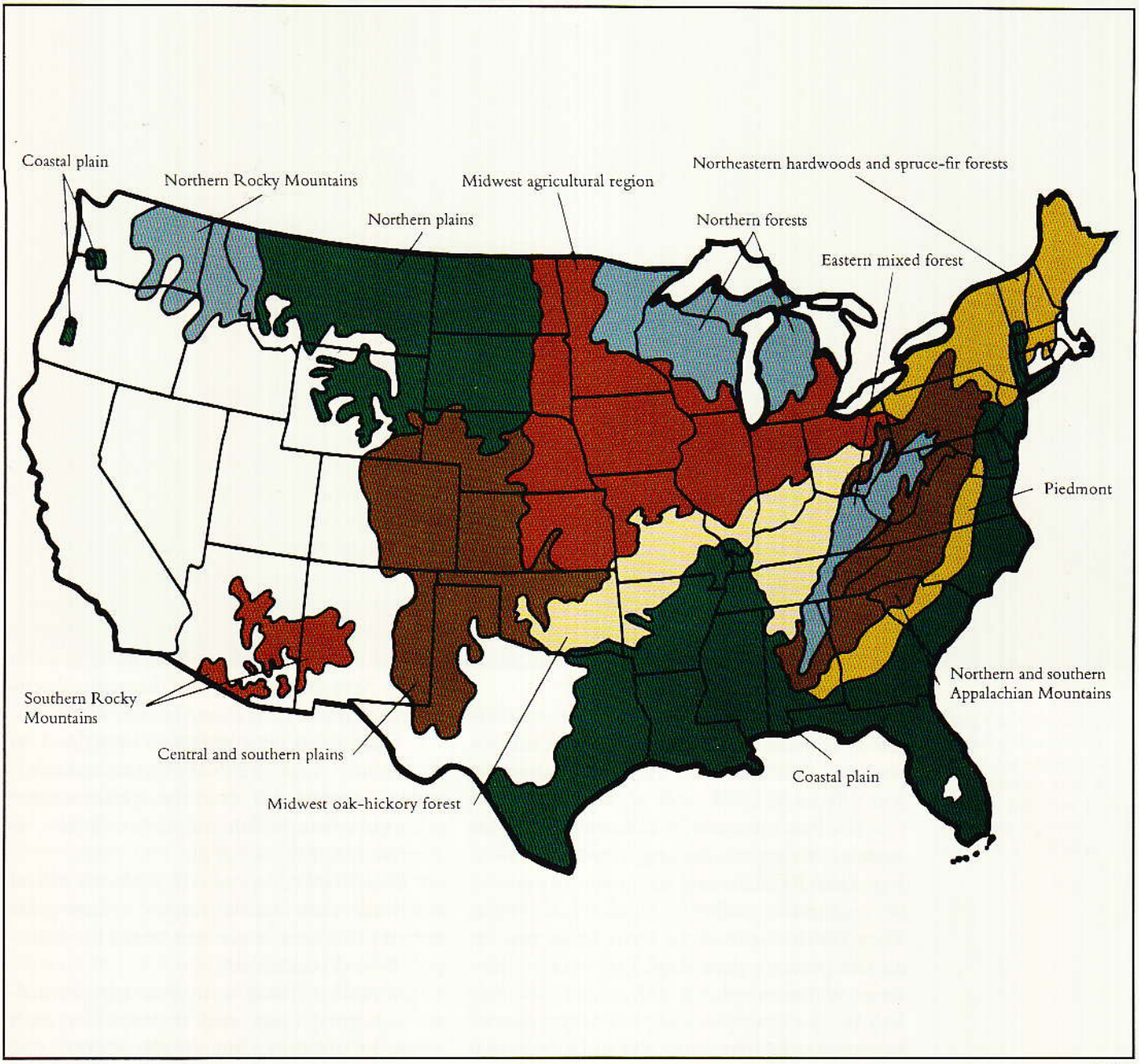


LITTLEJOHN

With no natural predators left on Fire Island, New York, whitetails coexist with summer vacationers. Unlike deer whose hooves are worn by rock and gritty soil, these animals have long hooves that help them move in soft sand.

Not all deer wintering areas are in spruce-fir habitat. At higher elevations with steep ledges, south-facing slopes collect considerably less snow cover and are thus suitable for deer.

Deer move to their wintering yards—to the same yards every year—when day length shortens or snow reaches a depth of 46 centimeters (18 inches) or more. Then conifer stands become attractive: the evergreen boughs reduce wind speeds and snow pack, and they provide overhead thermal cover and thus higher nighttime temperatures. The best conditions for deer include a 70 percent crown closure and 100-square-feet-per-acre basal area. As a measure of tree den-



LLOYD

A map of the U.S. vegetative regions superimposed on whitetail range reveals the extraordinary diversity of deer habitats. Although a continent apart and offering very different food and cover, the coastal areas of both the Southeast and the Pacific Northwest support whitetails. The Northwestern habitats, however, are fragmented and the deer populations are dwindling.

sity per acre, that 100 square feet—the sum of the diameters of all the trees in the given area—may include a greater number of trees if they are saplings, or fewer if they are older and larger.

Though Nelson and Mech indicate that yarding up may reduce predation, the primary reason is protection from cold: deer minimize the loss of body heat and thus conserve their energy when frigid temperatures and chill winds stress their metabolism. Shelter is so important, Verme found, that during extremely cold weather, deer stay in a yard even if the food supply is low. Deer in northern Michigan may stay in yarding areas for twelve weeks during mild winters but for twenty weeks during severe winters. Although snow depth keeps deer from moving once they are in their yarding sites, it does not appear to be the primary cause of yarding. Deer concentrate in yards before snow accumulates and remain at yarding sites even when snow conditions permit free travel.

—*Richard F. Harlow and David C. Guynn, Jr.*

The home range

The white-tailed deer is not a nomadic species. Each individual maintains a very real attachment to a particular piece of real estate. There are reasons the deer might range from this area and explore or even settle in a different area, and there are circumstances in which the boundaries may shift, but for the most part, the deer stays in its home range.

In the scientific literature there are different definitions of *home range* and various ways of delineating it. A classic definition was offered in 1943 by Burt, who explained it as the area traversed by the adult deer in its normal activities–feeding, mating, fawning–thereby excluding any migratory routes or exploratory sallies. Ungulate ethologist Fritz Walther coined the term *action area* for all the places a deer might go over its lifetime: winter range if it differs from summer habitat, for example, and the movements of bucks during the rut. Because deer live longer than radio transmitters, however, little hard information is available on their lifetime ranges.

The deer knows its home range and tends to use the same one year after year. In fact, different generations of whitetails often maintain very similar home ranges even if there are no natural or artificial "property lines," such as cliffs or fences, to keep the young deer from using feeding or bedding sites different from those of their mothers. This is particularly true of females and suggests a cultural component. In other words, the traditional home range, and familiarity with it, can be conveyed from one generation to the next.

There exist many examples of the whitetail's attachment to its home range.

- Deer have starved to death during winter rather than leave their depleted range for an area with better food just 2 or 3 miles away. Severinghaus and Cheatum documented several such instances in New York.
- Deer in Texas sometimes remained in their home range and died from lack of food, water, or even cover, even though there were no apparent impediments to movement, as observed by Thomas et al.
- Deer tracked by radio in Alabama would not leave their annual ranges to any great extent just to reach a concentrated food supply, Byford concluded.

Ignorance of food sources not in the animals' normal range may account for such examples of home-range loyalty, but on one occasion reported by Severinghaus and Cheatum, when starving deer were actually herded into better habitat, they refused to stay.

How Much Is Enough

It is advantageous, evolutionarily speaking, for an animal to become very familiar with a parcel of land. If it knows the area well enough, it can obtain the necessities of life–and escape from potential causes of death–with greater efficiency. The range must be large enough to provide sufficient

LEA

Deer graze while moving from one part of their range to another. The whitetails' well-worn trails allow them to travel efficiently from the deep forest to the edges and open fields of their range.

resources and cover, yet it must be small enough for the animal to know it well.

One square mile may be all the animal needs—that is what Severinghaus and Cheatum concluded in 1956 and what other researchers have since then found to be generally accurate. As far back as 1927, Ernest Thompson Seton observed that the home range of whitetails is probaby smaller than that of any other North American deer. Just how big the range is, in practice, depends on the particulars of time and space, age and sex, habitat quality and population density.

Lifetime patterns. The young fawn moves very little, in fact, not traveling with its dam at all but hiding on the forest floor until she calls it to nurse. After a few weeks it begins to run and play, moving around a bit more, and by the time it is two months old its home range begins to approximate the doe's.

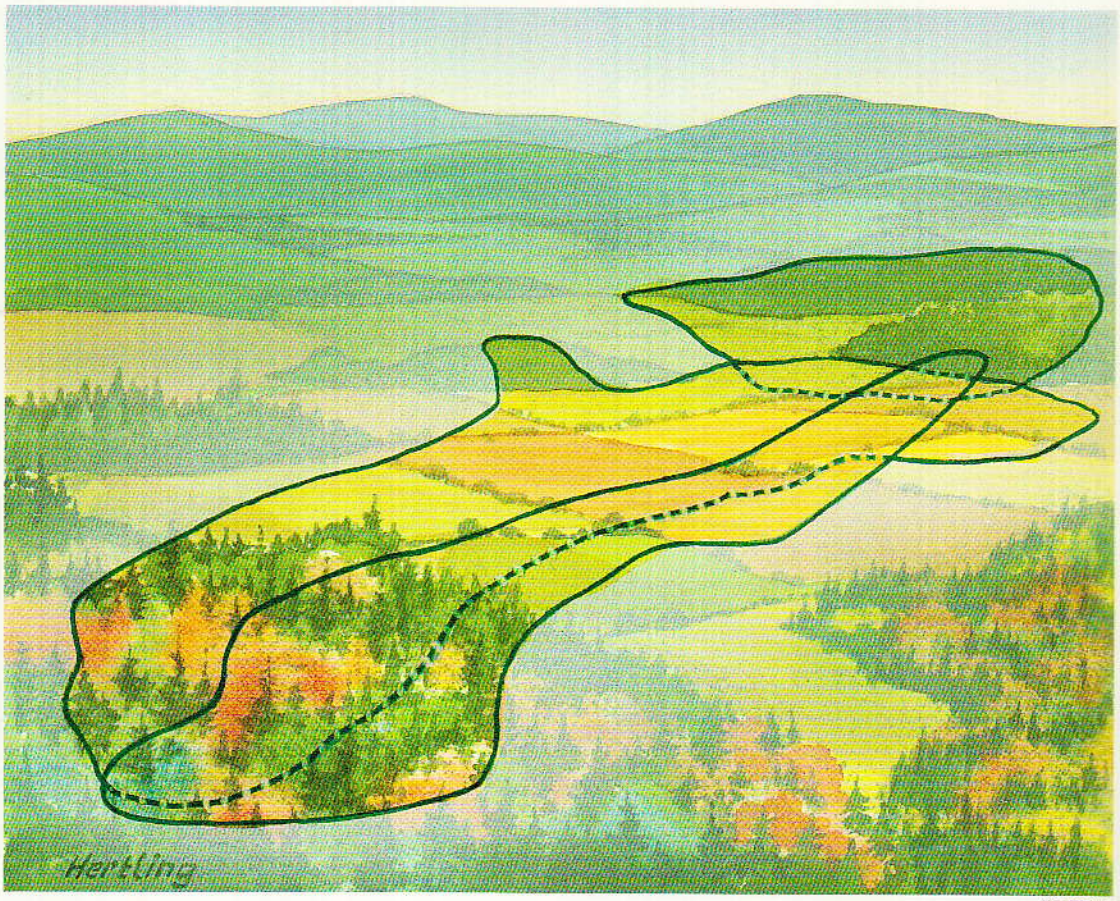
Among deer with very distinct seasonal ranges, especially those in northern areas, yearlings and young adults commonly move greater distances than older animals. Tagged 1½- and 2½-year-old deer of both sexes move much longer distances than do mature adults, according to Carlsen and Farmes. The researchers assume that deer range out during their early years and then gradually cease their wanderings. This also may be true of the more sedentary deer in the South.

Bucks have larger home ranges than does, according to most researchers, although some studies have found no difference. The greater size is more noticeable during the rut, when the buck's daily movements are less predictable. One buck studied in northern Georgia enlarged his range from 92 hectares to 244 in a six-week period—an increase of 150 percent, Kammermeyer and Marchinton reported.

In other regions, too, bucks range farther during the fall rut. Mattfeld and others observed that in New York, bucks expanded or shifted their range in the fall, while does occupied the same range they had used in spring and summer. Welch observed that Coues whitetail bucks in Arizona left their home areas in search of receptive does.

According to Brown, some large, mature bucks become highly mobile. These "dominant floaters" traverse extensive territory and

Fidelity to a home range can span generations. Despite the lack of fences, streams, or other natural boundaries that might delineate a range, two successive deer ranged within the same elongated area. Presumably the younger animal learned the limits from its mother. An adjacent range may belong to an older offspring of the matriarch.



HERTLING

may be contenders in the social hierarchies of several populations–presumably at the top in any of the groups of mature bucks they encounter.

Does tend to remain within their home ranges, though there is also evidence that if mature bucks are not around, does in heat leave their ranges in search of them. When ready to give birth, the does sometimes move to the periphery of their ranges to drop their fawns.

Regional patterns. Northern whitetails that move seasonally from winter to summer range and back again have large annual ranges. The greater the weather changes, the more movement between ranges may be necessary.

In the southern United States, in contrast, the annual ranges are smaller and more stable. Even within these sedentary classes, however, home ranges gradually shift through time, and as a consequence, a southern deer's lifetime range is substantially larger than its home range at any one point in time. The home range of such animals looks like an amoeba: it extends a little here, then a little there, and over time its shape and even location may change.

The survival advantages of a small home range–the deer knows it intimately and exploits its resources without expending a lot of energy or exposing itself to predators over long distances–must be weighed against its genetic disadvantages. Deer in a small area risk inbreeding.

The environment. How far the deer must travel to find food, water, and cover has an obvious effect on the size of its home range. These factors also determine the *shape* of the range.

If the necessary food, water, and cover are not located all in one place–and usually they are not–the deer must move around to meet its needs. The shortest distance between two points (or among three points) is a line, so the most efficient configuration for a home range is an elongated oval. Circular and irregular home ranges require an animal to move less efficiently and spend more energy. For this reason, the ranges of most birds and mammals, including deer, are elongated.

The extent of the elongation varies with quality of the habitat. If the habitat uniformly provides a good mix of essentials, or if the deer relies on only one type of vegetation, the oval is rather fat, and the deer ranges out in all directions from a central point to find what it needs. If the deer uses two or more types of vegetation, the oval is long and the deer's movements are more linear.

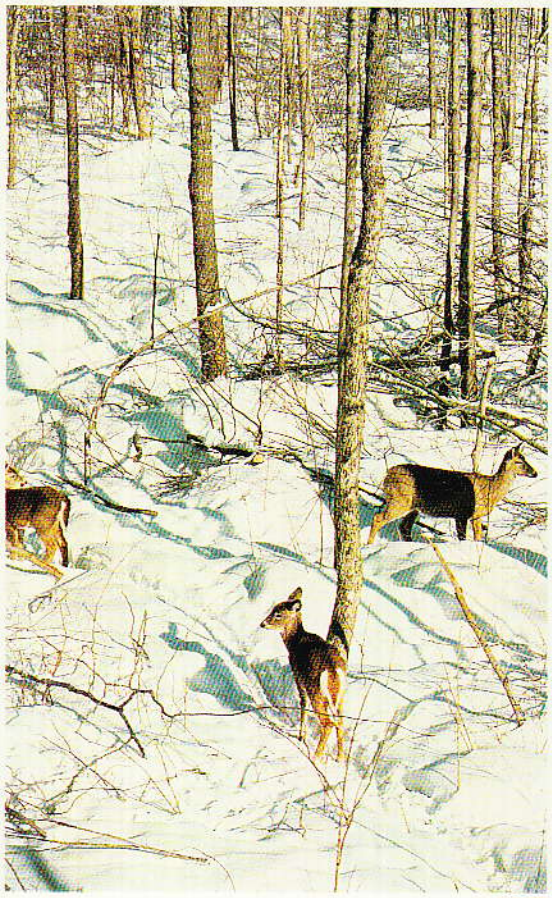
Among small mammals such as cotton rats and white-footed mice, individuals living in relatively open habitats have larger home ranges than animals inhabiting areas of dense vegetation. Studies of whitetails indicate a similar relationship between range size and vegetative density. For example, with other conditions being equal, deer in the open grasslands of the Great Plains tend to have ranges larger than those of deer in the dense forest regions of the southern and eastern United States.

Population density. Another general rule among mammals holds for deer: that average home range size decreases as population density increases. In an area of southeastern Minnesota that had fewer than two deer per square mile, Dorn reported that the deer moved extensively. In Florida surviving deer apparently expanded their home ranges when the rest of the population disappeared: Bridges and Smith, in separate studies, observed home ranges three times larger than those Marchinton had measured before and during the dieoff.

Despite such evidence, however, the inverse relationship between population density and range size does not prove cause and effect. Most deer studies, in fact, are conducted in areas with high populations, simply because there are more deer to find and observe. Comparable studies for deer in less populated regions don't always exist.

Where and When to Go

Although deer are not generally considered migratory, some whitetails do have distinct summer and winter ranges. In Missouri some deer leave their small, distinct summer ranges when winter arrives, according to Progulske and Baskett. Such seasonal movement is more pronounced, however, in the mountains and northern regions of North America. And it is where the differences between seasons—both meteorologically and vegetatively—are extreme that deer move the farthest.



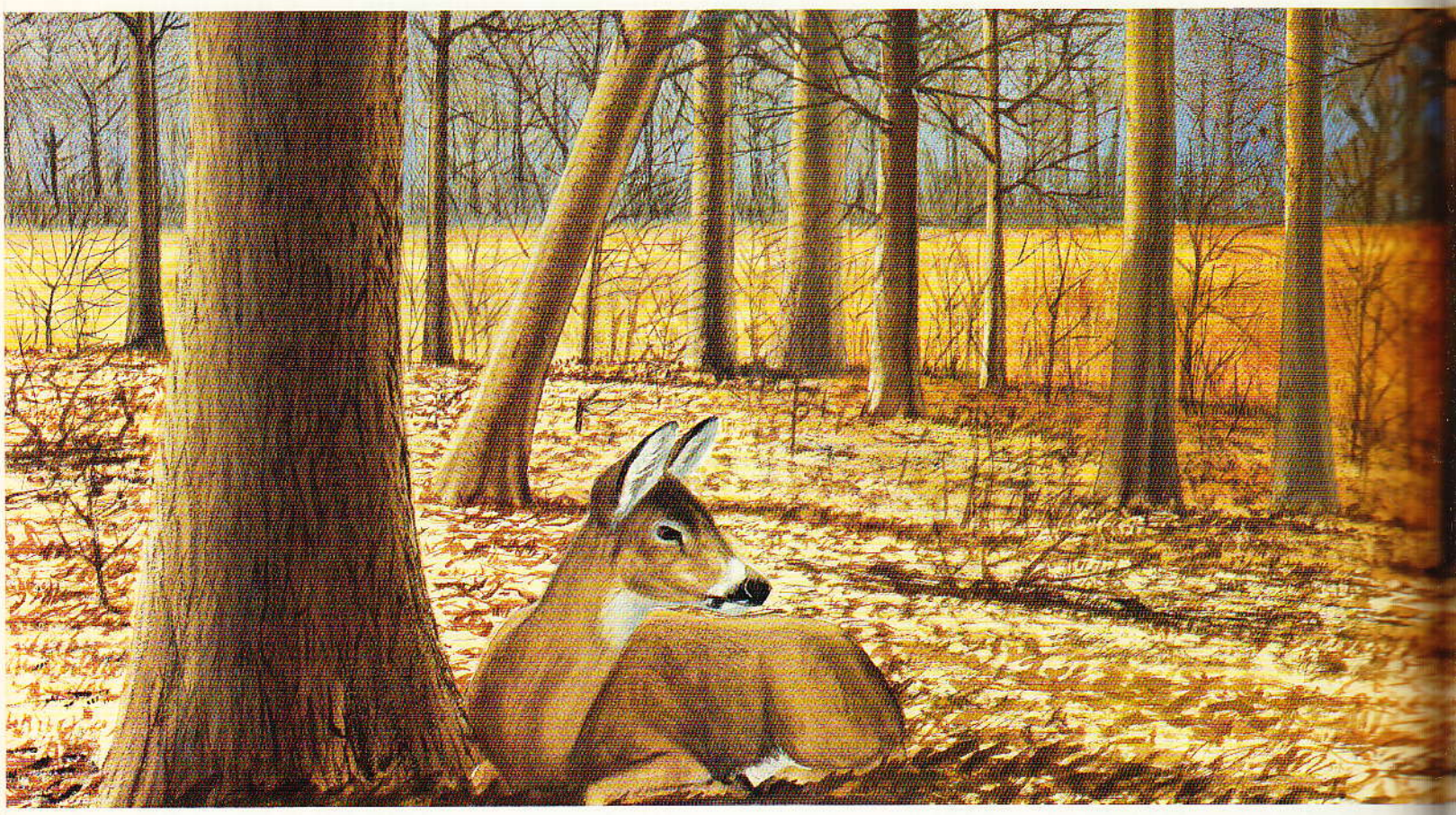
SCOTT

The use of established trails becomes especially important for whitetails in winter, when the animals have limited energy for forging new routes through heavy brush and deep snow.

In Minnesota, where winter temperatures may dip far below zero, deer moved as far as 92 kilometers (57 miles) from their summer range to spend the winter, Carlsen and Farmes reported. They left behind the now sparse deciduous or mixed forests that had provided a nutritious summer diet of berries, seeds, shoots, and leaves to take shelter amid the thick, low-hanging branches of evergreens.

Like deer that do not make seasonal treks, these deer use the same summer range year after year. Although they travel to the same general area for wintering, the specific winter range may be less consistent, according to a study by Mattfield et al. Tracking both individual animals and groups of deer, Mattfield suggested that the choice of winter range varies because of differences in snow depth and traveling conditions.

Timing. When deer move from summer habitat to winter is a matter of speculation,



During the day an adult doe bedded in or near the woods, then moved into the open field to feed at night. The telemetric studies and visual observations were made by Marchinton.

as is the signal that starts them on their way. Severinghaus and Cheatum found that fall and early winter migrations appeared to be responses to weather: as the cold deepened and the snow began to fly, the deer sought areas that would shelter them from winter's worst. The spring movement back to summer range seemed connected with the need for food, as the animals, now released from the restricted winter food supply, sought succulent spring forage.

The impetus in each case involved the deer's physical comfort, but Severinghaus and Cheatum cautioned, "The immediate initiating factor that prompts migration is difficult to determine, for the more obvious climatic factors and the pattern both of quality and availability of food differ widely in the whitetail range."

CORNELL

Migratory whitetails do not embark on the spring movement back to summer range until weather, snow depth, and new plant growth permit.

Similar observations and speculations have added to the literature but not settled all the questions since Severinghaus and Cheatum published that study in 1956. It still has not been determined precisely when deer move toward the yards in fall, or when they leave the winter range for summer grounds, or what actuates the movement in either direction. Among the recent observations:

- A sharp drop in temperature is important in triggering winter migration, a finding published by Verme and Ozoga and corroborated by Hoskinson and Mech, who used radiotelemetric data.
- Deer appear ready to leave the winter yard as soon as conditions—primarily the snowpack—permit them to travel freely, Verme reported.
- Does and juveniles take a fairly straight path from winter to summer range, but adult bucks are more inclined to wander, according to Rongstad and Tester.

Southern whitetails maintain smaller home ranges than their northern counterparts because there is less seasonal variation in weather and food supplies.

KIRKPATRICK

• Deer sometimes migrate directly from winter yard to summer range, but in other cases they make several false starts before finally leaving for good.

• The duration of the spring migration depends on when it starts: if its onset is delayed, the deer move faster, Hoskinson and Mech found. The result is that no matter when different populations begin the migration, most deer reach their summer grounds at the same time, in early May. The synchrony of their arrival may be related to the impending birth of fawns, to the availability of fresh forage, or to other, as-yet-unrecognized factors.

In the South. Southern ecosystems tend to be more biologically complex and undergo less drastic seasonal changes than those of the North. Temperature ranges do not fluctuate so widely, many broad-leaf plants are evergreen all winter, and snow never falls so deep or stays so long that it impedes travel or buries forage. There's less reason for a deer to move.

Still, shifts in centers of activity, not involving signficant changes in range, have been widely reported, most often because of shifts in sources of food.

And seasonal movements of considerable magnitude—whether they are true migrations is arguable—do occur in the South. In portions of the Everglades, deer follow the receding water south in dry times and move north ahead of rising water in wet periods. Annual movements of deer onto a refuge in northwestern Georgia have been documented by Kammermeyer and Marchinton. Some of the deer came from as far away as 8 kilometers (5 miles), and their presence nearly doubled the refuge population. Habitat conditions, herd history (the moving deer, or their dams, were familiar with the refuge, having originally been stocked on it before gradually spreading across its borders), and hunting all played roles in this movement, but hunting pressure outside the refuge was certainly an important factor. Farther south, the use of dogs to hunt deer, traditional and legal in some places, apparently makes the deer population more mobile and results in more genetic mixing.

—R. Larry Marchinton and Karl V. Miller