

FILE COPY  
DO NOT REMOVE

# DEER MANAGEMENT ON PRIVATE LANDS

COOPERATIVE EXTENSION SERVICE  
MICHIGAN STATE UNIVERSITY

*By Charles Shick  
Extension Wildlife Specialist*

MANY PEOPLE VALUE DEER because they simply enjoy seeing the animals in their natural habitat. Others like to see the animals but also enjoy hunting them for sport. Because of these interests, many people own land in "deer country" as individuals or as members of clubs. Some of these same people are looking for ways to maintain or improve living conditions for deer. You may be one of them.

This bulletin was prepared as an aid to land owners interested in managing their land for white-tailed deer. It does not provide a simple management formula which can be applied to all land. There is none. However, it does include information which must be considered in all good deer management plans. In general it discusses the needs of deer and some management measures, including limitations of what can be done to benefit deer.

## WHAT IS DEER MANAGEMENT

Deer management means making land produce continuous harvestable crops of healthy deer for recreation and enjoyment. It is complicated, requiring an understanding of complex relationships between animals and the land on which they live. It involves a knowledge of the life cycle of deer, their reproduction rates under different conditions, and their seasonal food and cover needs.

Deer management plans should provide for present and future needs of deer. They should be economically sound



and should consider other valuable natural resources such as timber, soil, and water. Income from wood products often will pay for deer management practices. A plan should be tailored for each particular area and should also consider existing living conditions (habitat) and management measures, if any, on surrounding lands. The development of a good plan requires time, patience, and usually some outlay of cash.

#### DEER BIOLOGY

- **White-tailed deer** belong to the family *Cervidae* which includes moose and elk. Live-weight of an average adult deer is between 125 and 150 pounds. A 200-pound animal, or one measuring 3½ feet from ground to top of shoulder blade, is unusually large. In general, age and availability of a year-round food supply determine size and weight.

- **Deer** are primarily animals of the "young forests," having much low growing food and cover, plus some open grass and brush areas. They find life easiest on areas producing a variety of plants in all stages of development. A large mature forest without shrubs, small trees, grass, and brush openings is not a good place for deer. Such areas provide shelter but little food.

- **As with other animals, deer must have good food for energy and to build body tissue.** Chiefly a browsing animal, they feed on leaves, buds, and tender end-twigs of many kinds of shrubs and trees. Food digestion takes place in the stomach. Browse is broken down and dissolved by digestive juices and some very tiny plants and animals. These microscopic inhabitants of the deer's stomach include bacteria and protozoa. Different organisms work on different materials.

Some plants are poor foods simply because they cannot be broken down and dissolved by the deer's digestive juices and microorganisms. Probably this is the reason deer will starve on a steady diet of needles from spruce and balsam fir trees. This will happen even though the animals are able to get large amounts of this poor browse.

- **The mating season of Michigan deer occurs from early October through mid-December, with the peak in early November.** One buck deer usually serves four or more does. During these months an adult doe may have three "heat" periods about 28 days apart, with each receptive period lasting 24-36 hours. On good deer range about ½ to ⅔ of the doe-fawns will mate successfully at the age of 6 months and will produce fawns when 1 year old. Under poor range conditions hardly any breed and produce young this early.

- **Gestation or pregnancy period is 200 to 210 days, with fawns born in late May or early June.** Yearling does, bred at the age of 6 months, usually produce a single fawn

after their first mating. They usually produce twins there-after, depending mainly on their health, which is influenced by how well they are nourished. At times triplets will be produced by mature animals. Deer are most productive between 4 and 6 years of age. A few more males seem to be born than females but male fawns have a higher mortality rate. By November the sex ratio of the fawn population is about equal. Fawns generally are weaned and lose their spots by the end of September.

- **Deer are prolific, and under ideal conditions, one buck and five does could increase to 1,000 animals in 10 years.** This great tendency to multiply (high breeding potential) is of vital importance and must be considered in all good deer management plans.

A good example of how rapidly deer can multiply is shown by research data gathered at the Edwin S. George Reserve in Livingston County. This 1,200-acre tract of land, enclosed by a 7-foot woven wire fence, is managed by the University of Michigan. Two bucks and four does were released in early winter of 1928. Five years later (December 1933), the first deer drive and count on the Reserve indicated the presence of 160 deer. Since the winter of 1934-35, the general policy has been to harvest the two sexes about equally and to shoot some fawns each year. An effort has been made since 1942 to keep the winter population at about 25-30 per square mile. Good living conditions are maintained for deer on the Reserve when the winter deer concentration does not exceed this limit.

- **Male deer grow a new set of antlers each summer,** shedding the old ones sometime from December to January. Antlers are soon eaten by mice and porcupines and consequently are seldom found by people. Except for rare freaks, female deer do not grow antlers.

- **A buck's antler growth depends as much on the presence of quality food as on his age.** When well fed and in good physical condition, the older animals (3-8 years) usually produce the largest racks. Healthy, vigorous 1½ year old bucks, living in good winter food areas, generally will grow 3-inch antlers or small racks. It may take 2½ years or more for 3-inch "spikes" to develop on animals living on poor range. Thus, many bucks in food shortage areas must feed at least an extra year before they become legal targets under a "bucks only law." This is an important consideration in management of areas where food is already scarce.

- **Antler-size is not a reliable measure of age.** A better indicator is the development stage and condition of the teeth, as it is with some domestic animals. By 18 months, milk ("baby") teeth are replaced by permanent ones. An animal having a new set of permanent premolars is generally 1½ years old. The age of older deer is judged by the degree of wear on the teeth.

- **In summer throughout Michigan deer can roam over large areas in their search for food.** They generally move about freely even in winter in the southern third of the state and during exceptionally mild winters in the

This publication is the result of cooperation between the Fisheries and Wildlife Department and the Cooperative Extension Service of Michigan State University and the Michigan Department of Conservation. It is based on research data gathered over the years by biologists of several agencies in Michigan and other states.

Drawings on pages 4, 5 and 6 were prepared by Oscar Warbach, Illustrator, Michigan Dept. of Conservation.



light snow regions of the north. However, deep snow and severe winter weather restricts them to "deer yards" in much of the northern areas. Deer yards are sheltered areas in swamps, in lowlands next to streams or lakes, or in upland conifers (evergreens) or other heavy cover. Normally deer remain bunched in these yards for 90 to 115 days and availability of food from January through mid-April is a critical factor.

- A short supply of winter food will result in either starvation or the animals becoming susceptible to disease. The chances are that their growth rate will be retarded and fawn production will decrease. A well-fed adult doe will raise about two fawns per year. In poor physical condition, she may be lucky to raise one, that is, if she doesn't die before spring. How many fawns will 50 does produce and raise under good and poor range conditions? Such calculations are important in the development of deer management plans.

### FOOD HABITS

Before a successful management plan can be developed, you must know something about the kinds of foods normally preferred or disliked by deer. You should be able to recognize evidences of browsing and be able to note the scarcity or absence of certain kinds of trees and shrubs on the area to be managed for deer. A leaflet entitled, "Hunters' Guide for Identifying Deer Foods" is available without charge from the Michigan Department of Conservation, Lansing 26, Michigan. This useful circular describes trees and shrubs which produce food—it also identifies inferior food plants eaten by deer as a last resort.

A healthy 70-90 pound animal needs a daily summer diet of a bushel (5 to 7 pounds) of green leaves and twigs, and in winter 5 to 7 pounds of assorted twigs and buds. Pennsylvania tests indicate that, on the average, a daily ration of 4 pounds of good quality food is needed by a fawn weighing 50-60 pounds; 6 to 8 pounds by a 100-pound deer, and 10-12 pounds by a 150-pound animal. Similar results were obtained through research in Michigan.

Acorns are good food. Unfortunately, they are not plentiful every year. Spring frosts often destroy oak flowers and cause acorn shortages. Northern Michigan studies show that a good acorn crop can be expected in only 2 out of 5 years. Deep snow also limits acorn availability, usually covering them on the uplands next to deer yards.

In Michigan white cedar is the best winter deer food. When available, cedar browse will keep deer in good shape throughout the winter. Other foods of varying nutritional value are the leaves, twigs and buds of hard (sugar) maple, yellow birch, red maple, black ash, wild cherry, dogwoods, viburnums, Juneberry, aspen (popple), hemlock, white pine, jackpine, sumac, sweetfern, witch-hazel, and willows. They must, however, be taken in combination. With the exception of white cedar, deer don't do well on a diet made up of browse from a single species.

Some trees and shrubs are worthless as deer food. For example; twigs, buds, and foliage from white and black

spruce, balsam fir, tag alder, beech, leather-leaf, and red pine provide little nourishment for deer. Deer may feed on them only when the better foods are no longer available. Thus, feeding on these plants indicates a serious food shortage or poor deer range.

Grasses and cultivated crops such as alfalfa, rye, vetch, and corn are also eaten. However, with the exception of standing corn, they too become buried in deep snow. Also, in winter, deer generally move to more sheltered lowland areas where these crops do not grow. Many cultivated crops do not do well in northern Michigan's wildland.

### DEER NUMBERS vs. HABITAT

The habitat of deer is constantly changing—a fact which cannot be over-looked. Today's northern Michigan landscape is different than it was in 1900, or 1940, or 1960. It will be different 5 years from now. The changes which occur alter the carrying capacity of the land. The deer-carrying capacity of an area is the number of healthy animals a unit of land can support without habitat depletion. It changes with the seasons and over longer periods of time. It is different on different areas—depending on soil, drainage, timber types, rate of plant growth and other factors.

After the logging operations and extensive forest fires during Michigan's early years, a growth of small trees and shrubs covered the land. This young forest produced much good low-growing food and cover. However, as the second growth trees grew up, some young trees and shrubs died because they were crowded and shaded out. This is a normal process. Natural pruning of the maturing trees also took place. The lower branches died from lack of sunlight and the tender twigs high on the trunks were out of reach of the deer.

Seedling tree and shrub reproduction is practically nil in a mature forest. Only a few trees such as hard maple, hemlock and beech can grow in semi-shade and even these may not grow in extremely dense forest cover. Most cedar swamps used by deer in winter lack young plants. The youngest white cedars in some places are 20 to 30 years old. This is an indication that factors of shade, competition for soil nutrients and moisture, and/or over-browsing by deer have halted reproduction. Today in many places it is impossible to get white cedar reproduction started either naturally or by planting.

Deer have no evident foresight and their feeding habits are not always compatible with their future welfare. When too numerous, they can destroy their own habitat. The animals will destroy seedlings, trees and shrubs before the plants can get established. By over-browsing, deer will kill small food-producing plants and thereby change plant succession. This has happened in Pennsylvania, Wisconsin, New York, Michigan and other states, and it takes many years to restore good deer range after over-browsing. Thus, planting trees and shrubs is useless in places where deer are too numerous for the amount of food produced each year.

## DEER vs. TIMBER

Making land produce optimum crops of both deer and timber is difficult if not impossible. Some good timber management practices do not favor deer and some recommended deer management measures do not benefit timber production. Fortunately, however, there are some management techniques which favor both resources. The applied practices will reflect the landowner's interest in deer and timber. In most instances he will manage his land for both.

### FACTORS AFFECTING MANAGEMENT

Some factors which affect deer and the land on which they live may be man-made; others are the result of natural forces. Some may be beneficial; others not. Some factors may be easily detected; others may be difficult to uncover and evaluate. Some can be controlled by the landowner; others cannot.

Here are some things which affect deer management on an area:

- History and size of area; number of roads into it.
- Landowner's knowledge about good deer management practices.
- Hunting pressure and hunting regulations.
- Cost of management and owner's expected returns, if any.
- Availability of equipment and labor.

- Land use possibilities, soil productivity, topography, climate.
- Forest types including age, composition, growth rate and quality of timber stand.
- Size, age and sex composition of the deer herd on the area and on surrounding lands.
- Relative importance of other wildlife species and other resources.
- Degree of consideration for timber production.
- Competition between deer and other animals.
- Seasonal deer food and cover conditions on the area and on surrounding lands.
- Location and ownership of deer yarding areas.
- Nearness to wood-utilizing industries and the demand for certain forest products.
- Number of land owners involved, their place of residence, their degree of cooperation, their desires and prejudices.
- Attitude of land owner or club members regarding recommended deer management practices.
- Attitude of neighboring land owners towards deer management.
- Public opinion regarding deer management in the area and state.
- Aesthetic values.
- Possible deer damage to cultivated and forest crops.
- Distance between managed area and owner's place of residence.

### IDEAL DEER RANGE



## SIZE OF MANAGED AREAS

A large solid block of land made up of several thousand acres,\* is better suited to deer management than a small area consisting of a few hundred acres. For example, an area consisting of 10,000 acres lends itself to deer management much more readily than a 100-acre tract. The chances are that the larger unit will have diversified cover and will include both winter and summer range. Then too, management plans for the larger tract do not require as much consideration of existing conditions on surrounding lands. The large area will be more practical to manage under a timber-cutting rotation plan (years between cuts). It is difficult to set up such a rotation program on small land parcels and it would be next to impossible to manage 100 acres for deer and timber too.

Where land ownership is broken into small units and owner cooperation is expected to be good, property owners might well organize and operate under a single management plan. This approach demands full cooperation from all landowners concerned with the plan. Otherwise the program will fail!

## CONSIDERATIONS IN MAKING DEER MANAGEMENT PLANS

Appraisal of deer populations is difficult and requires time and the services of trained technicians. It is almost always true that there are more deer than is apparent to the landowner. Suggestions for estimating deer numbers

\*An acre is about the size of a football field.

can be obtained from the Michigan Department of Conservation, U. S. Forest Service, and several wood-utilizing industries.

Although deer population figures are not always needed, you must know the physical condition of the deer, the rate of reproduction, and their effect on deer food and timber producing plants. Careful and objective analysis of at least some of the following conditions on your area will serve as a base for your plan:

1. Extent of browsing on winter range. Are preferred foods available? Is there evidence of browsing on "starvation foods" such as spruce, balsam, red pine or beech? Is there evidence of a "browse line"?
2. Extent of browsing on summer range.
3. Amount of successful tree and shrub reproduction. Are deer destroying seedling plants? Have they eliminated certain kinds of young plants generally found growing in a given location?
4. Growth rate and age of trees. How long will it take natural pruning to eliminate available browse? When can the trees be cut for market? What is the expected time period between cuttings?
5. Antler development of buck deer. Are the antlers small and poorly developed on older deer? Do yearling bucks (1½-year-olds) have well-developed antlers?
6. Weight of harvested deer. Are they stunted?
7. Ratio of fawns per doe. What is the percentage of adult female deer raising twin fawns? What is the percentage of adult deer with one fawn? Percentage without any fawns?

SAME SPOT, YEARS LATER — NOW POOR DEER RANGE





8. Age ratio of deer taken by hunters. Is there a shortage of yearling bucks? They should make up a high percentage, 60-75 percent, of the kill in heavily hunted areas. A low proportion of yearling bucks is generally a reflection of poor range conditions.
9. Deer die-off from malnutrition (starvation). How serious on or near your area?
10. Species, size, age, density and quality of timber. Is there a market available for mature trees?
11. Acreage of upland and lowland timber types. The larger the acreage, the simpler it will be to make cutting plans.
12. Damage to cultivated and forest crops. Are deer destroying valuable crops?

## FOREST COMPOSITION AND MARKETS FOR WOOD

The species, size, age, density and quality of the trees in a timber stand will affect management measures by determining when and if trees can be sold on the commercial market. Demand for certain wood products varies with time and place. It is usually impractical to harvest and attempt to sell aspen trees where there is little or no demand for pulp wood. Low quality trees and poor stocking (number of trees per acre) also present marketing problems. It may not pay a logger to operate in an area where the saleable timber is widely scattered over a large area. Wood-utilizing industries may be located too far away to justify expense involved in hauling. On the other hand, our human population is growing, and demand for timber products will increase. Also new scientific findings will enable industry to use trees of low quality. These factors should affect deer range management in many Michigan localities in the future.

## MANAGEMENT RECOMMENDATIONS

All lands will not support high concentrations of deer. (Average fall density of 25 animals per square mile would represent a high population.) This is because each unit of land is inherently restricted in its ability to produce nutritious food. Some areas will be low producers no matter how well they are managed. In other words, the carrying capacity of some lands can be 25 deer per square mile. On the same unit of inherently poor deer range it could be less than five animals. This could be compared to production of corn or other farm crops. Some lands will grow good yields of corn, others will be comparatively low producers even though intensive cultural practices are applied.

The following is a discussion of some things you can do to improve conditions for deer. Remember that management plans should be tailored for each particular area. Thus not all the suggestions will apply to your land.

## INVENTORY

1. The first step in management is to inventory the financial and natural resources you must work with. Make an appraisal of existing habitat conditions of your land. Evaluate production possibilities and limitations of your

land. Determine the health and vigor of the deer. On the basis of these appraisals determine your management objectives. This may involve setting up some priorities.

## ADJUST DEER POPULATION

2. The second step for good management is to adjust the deer population to existing habitat conditions by harvesting surplus animals adequately during hunting seasons. This is and has been a very critical problem on many private lands where hunting pressure has been low. Where state regulations permit, harvest bucks, does, and fawns to maintain the delicate balance between deer numbers, food supply and timber production. In most instances 25 per cent of the total pre-season population can be safely harvested. About half of the annual harvest should be antlerless deer (does and fawns).

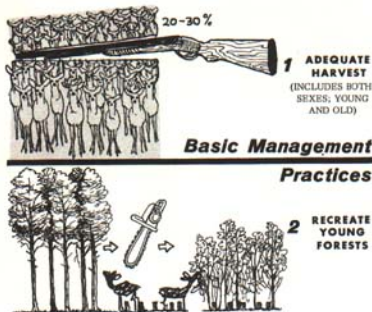
## IMPROVE HABITAT

3. The third step is to improve habitat and thus raise the carrying capacity of the land. You can do this only when the deer population is in harmony or in balance with existing range conditions. There is no use trying to improve the habitat before conditions for plant survival and growth are certain. Hungry deer are voracious feeders. When too numerous they can destroy food producing plants. The objective in habitat improvement is to create food and cover situations which favor deer production. Although ideal habitat conditions are difficult to attain even with the best management programs, your efforts should be directed toward this goal. Good deer habitat will have food close to the ground and cover well distributed, resulting in much "edge." ("Edge" is the border where two or more cover-types come together.)

Ideally, each 100 acres of a managed unit should have the following proportions of cover: 15 acres crop and/or grasslands, 35 acres brush (shrubs and young trees), 35 acres in upland hardwoods, and if possible, 15 acres of coniferous cover or lowland woods. The woodlands should consist of a variety of trees and shrubs in all stages of growth to insure ample quantities of good food and/or winter cover.

Cut mature timber as soon as there is a market for the wood. Cut in winter when practical, so deer and other animals can feed on the downed tree-tops. See that some of the cuttings are near winter deer yards so food is close to shelter. Cut in more than one place where possible. This could prevent deer from concentrating and overbrowsing in one area.

When harvesting aspen (popple) trees, clear-cut all mature aspen and nearly all associated trees in the stand—that is, all species of large trees except for a scattering of cherry, oak and Juneberry. This gives aspen sprouts and other young trees and shrubs the full sunlight they must have to insure growth. Aspen alone will not sustain deer. The tender twigs, leaves and buds must be eaten with an assortment from other trees and shrubs, so encourage a variety of woody plants to grow. Do not expect dense sprouts if deer numbers exceed the carrying capacity of the range.



## Basic Management Practices

Plan timber cutting operations on some rotation basis when possible. Unfortunately, this may not always be practical for one or a number of reasons. A cutting program may not be economically feasible on small ownerships or where markets for wood may be lacking. Then too, not all forest types lend themselves to short rotation cuttings. Aspen, a fast grower, is best suited for this kind of management. Good aspen areas can be clear-cut every 35-40 years. Hard maple forests are not as easily managed for deer because trees are slow-growing and are usually selectively cut. Lands growing other good quality sapling or pole-size hardwood trees, also are difficult to manage for deer. You might conclude that such areas are in the "awkward stage" of development. They are of little food value to deer and produce little or nothing for wood-utilizing industries in their present state. Very little, if anything, can be accomplished for deer on such lands when the owners expect future monetary returns from the timber crops. Eventually, however, time and cutting programs will improve conditions for deer. Consult a forester about your cutting program.

### Cutting, Bulldozing, Spraying

- Improve areas producing non-merchantable trees and undesirable shrubs by cutting, bulldozing, disking, burning, or applying herbicides.

Extensive areas of mature non-merchantable oak and red maple trees should be subjected to some cutting or bulldozing, whichever is more practical. Cutting is best to induce stump-sprouting. The openings created by either method should be scattered and should be one acre or larger, depending on the size of the forest area. This will provide low cover and food for deer and other wildlife. The remaining large oaks will produce acorns. Cut or bulldoze in winter if possible. Keep in mind that desirable results will not be obtained if deer exceed the carrying capacity of the land.

Spraying with herbicides (2,4-D and 2,4,5-T) and burning have their limitations because desired results are difficult to achieve. These techniques are usually limited to

areas producing large trees of little commercial value. Burning usually presents a hazard and could get out of hand without fire-fighting equipment and adequate manpower. \*(See footnote). Consequently, herbicides are favored over burning. However, caution also must be used with chemicals, since careless use can destroy desirable trees and shrubs on managed units and adjacent lands. If spraying is desirable and practical, spray by plane or from the ground with hydraulic equipment as soon as leaves have grown to full size, usually after June 20. This will kill large non-merchantable trees and allow sprouts and seedlings to grow. Aspen trees growing under poor site conditions are best suited for herbicide treatment. Biologists from the Michigan Department of Conservation or representatives of herbicide manufacturers can supply additional information on controlling vegetation with chemicals.

### Planting Trees, Shrubs

- Large blocks of open land (160 acres or more) produce little food and cover for deer or other wildlife. Portions should be planted to trees and shrubs. When planting, remember that deer and other wildlife need some brush and open areas. (See item 3 under this section on management recommendations.)

Tree planting operations generally involve the use of coniferous trees such as jack pine, white pine and red pine (sometimes called Norway pine). Broad-leaved seedlings (maple, cherry, dogwoods, hawthorn, Juneberry, etc.) are difficult to plant because they generally have large root systems and/or require heavier soils than pine for good growth. Survival is usually low. Along with costing more than coniferous seedlings, they often need cultivation and fertilizer.

When coniferous trees are planted on large tracts of open lands, plant seedlings in one to five-acre clumps or in 50' - 60' strips. Such operations will create maximum "edge" needed by deer and other wildlife. Spacing between seedlings should be at least 8' x 8'. The pine strips will eventually provide travel lanes, escape cover, loafing areas and, in some cases, winter cover. Remember, however, that the animals will starve on a steady diet of pine needles. If possible encourage or maintain brushy areas about 50' - 60' wide between the planted pine strips. As the pine trees grow, cut those on the outer edges to prevent shade from encroaching on the open or brush areas. Except at edges, pine plantings generally lose their value for deer and other game after 18 to 20 years.

### Natural Trees, Shrubs

- Encourage natural tree and shrub reproduction on large open areas. Woody plants often respond favorably when land is simply worked with tractor and disc. Fertilizer will aid plant growth in some situations.

### Oak Trees

- Whenever possible, allow some mature acorn-producing oak trees to grow, especially near winter yarding areas. In years of good acorn production, 20 mature oaks next to a deer yard will provide an adequate supplement to carry one deer through 90 winter days, provided the

\*A permit must be obtained from your local conservation officer before fire can be employed to clear or improve your land.



snow is not too deep. Also maintain some Juneberry, thornapple and cherry trees.

#### Artificial Feeding

• When a landowner resorts to an artificial feeding program, it is because he feels that the range cannot support the number of deer present or the number the land owner thinks he should have.

Most emergency winter "conditions" can be avoided by an adequate harvest of deer of both sexes the preceding fall. Artificial feeding should be undertaken only as an emergency measure to carry deer over an *unusually severe* winter. Then plans should be made to increase the harvest of deer during the fall by added hunting pressure.

Artificial feeding has serious draw-backs. Besides being costly, it often attracts animals from surrounding areas and thus intensifies local natural food problems. Once started, it must be continued throughout the winter. Even though deer can be winter-fed artificially, they will continue to browse heavily on natural vegetation. Often young plants are destroyed before they can produce much food. Therefore, artificial feeding programs will not necessarily enhance the production of natural foods. If it works, it merely increases the herd problem the following winter.

You can feed the animals hay, corn, or commercial food pellets during an unusually severe winter. Use best grades of alfalfa hay since there is little nourishment in the poor quality hay. Scatter the hay—don't pile it—in places where it will be available during periods of deep snow. A 70-pound bale of good alfalfa hay will support a 150-pound deer for about 1 week to 10 days. When commercial pellets are fed to deer, feed at several locations. This should prevent deer from concentrating at one place. An adult deer of average weight (120-140 lbs.) needs about 3 pounds of food pellets per day plus some good browse.

Corn can be planted on fertilized areas where growing season and soil conditions are suitable. Use early maturing varieties of field or pop-corn. Plant in spring as soon as possible and practical. Use plenty of fertilizer. The corn patches should be established close to deer yards so the food is available to the animals in winter. The corn must produce ripened ears on sturdy stalks which stand above snow to be of value to deer in winter. This is not always possible in most of northern Michigan. Contact your County Extension Agent for additional information about the possibilities and limitations for planting corn and other crops, seeding rates and fertilizer requirements.

Deer can be attracted or baited to areas growing certain crops. Such crops can be useful in harvesting animals during the open season. You may wish to plant rye and/or vetch on fertilized plots, 2 to 5 acres in size, or in long strips about 50-60 feet wide. The plantings should be near winter cover. Do not consider this a cure-all for shortages of natural foods because cultivated crops are usually covered by deep snow in winter. In fact, deer generally feed on them only in fall and spring when native June grass is also available. Rye and June grass, when in the same stages of growth, have about the same nutritive value. To keep healthy and vigorous, deer must have more than June grass, vetch, or rye.

Remember, deer are basically browsing animals and depend on leaves, tender twigs, and buds of a large variety of trees and shrubs for a balanced diet. If it's available, they will eat the natural browse even with artificial feeding programs. Thus, supplying cultivated crops in winter will do little to increase the natural browse in food shortage areas.

#### SUMMARY

When deer numbers exceed the safe winter carrying capacity of the range, some animals may starve or become susceptible to disease. Female deer managing to live through the winter will be poorly nourished and will raise few fawns. Food plants will be severely damaged or destroyed, further lowering the land's ability to support deer. At the same time, valuable cover and timber resources may be lost. Thus a long range plan must maintain a balance between deer number and the annual production of winter food. The kind of deer harvest should be determined by the carrying capacity of the land.

To keep the herd healthy and to insure a continuous supply of browse, deer numbers must be adjusted to the production of natural foods. There is no other practical way! A large herd in fall may need to be reduced drastically to prepare it for over-wintering. To prevent the animals from over-browsing, it is necessary to reduce the fall deer herd by harvesting bucks, does and fawns from many areas. On some lands it may be possible and desirable to maintain the present population level. On a few areas where there is a surplus of winter food, deer numbers can be allowed to increase by shooting bucks only.

In general the problem is a matter of population versus food supply. If a farmer keeps too many cattle on a good pasture, he will eventually end up with a poor pasture. He must remove enough cattle to allow the pasture to return to full production. This may be a slow process. By holding the size of his herd within the limits of the pasture's ability to produce food on a continuous basis, he could maintain more animals in the long run and keep his good pasture too. The same can be said about deer and their food-producing areas.

Ideally, deer management plans will include:

1. Appraisal of local range conditions.
2. Appraisal of health, vigor and number of deer.
3. Plans for harvesting surplus animals.
4. Plans for increasing food and cover.

**References:** Additional information on natural resources is available from your local county extension agent, or the Bulletin Office, Michigan State University, East Lansing. Information also can be obtained from district game biologists and foresters of the Michigan Department of Conservation, U. S. Forest Service, and U. S. Soil Conservation Service.

Several wood-utilizing industries have foresters or biologists available for consultation regarding land management for deer and timber. County Agricultural Extension offices can provide names of such companies.