

MICHIGAN DEPARTMENT OF CONSERVATION

GAME DIVISION

Report No. 2187

June 24, 1958

WILDLIFE HABITAT IMPROVEMENT

During recent years wildlife habitat improvement has become one of the major programs of the Game Division. It is not a new program. It was initiated back in 1931 in an attempt to increase the amount of deer browse on the already overpopulated deer range. It increased in the northern part of the state during the CCC days, and was introduced into southern Michigan in the form of a farm game program in the middle 1930's when several demonstrational plantings of woody cover and food patches were made. Also in the middle 1930's a few wildlife flooding projects were built. Northern deer browse planting was curtailed because of lack of success prior to the start of World War II. With the advent of a land acquisition program in southern Michigan in the late 1930's habitat improvement was initiated to improve the acquired lands in about 1940. Practically all habitat improvement, except deeryard management cuttings, was discontinued during the war years and it wasn't until after the war that the program as it exists today began to take shape. The northern Michigan program, which applies generally throughout the forested northern two regions, was drastically overhauled and put on a more realistic basis. Land acquisition in southern Michigan was continued and expanded during the war and a stepped up program was needed and initiated to improve these lands. In 1948 the Farm Game Restoration Program was started as a means of helping to combat the slump in the pheasant population. Also in 1948 construction of wildlife flooding projects became an important activity of the Game Division. These four parts,

Wildlife habitat improvement on northern forest lands,
Wildlife habitat improvement on southern Michigan game and recreation areas,
Farm Game Restoration Program, and
Habitat improvement for waterfowl and furbearing animals

make up the program as presently practiced.

Each part is covered separately in the following discussion:

WILDLIFE HABITAT IMPROVEMENT ON NORTHERN FOREST LANDS

One of the basic principles of game management is that suitable habitat is necessary to the very existence of a game species. The virgin forests were scarcely suitable. But following the early logging and the extensive forest fires, excellent habitat developed over vast areas of northern Michigan in an incredibly short time.

FOREST LAND

Now a great deal of the brushland which was so productive of native game species has grown up to pole-sized forest. Just as the axe was the basic tool which created our first great wildlife reservoirs in the north so now is the axe the best tool at our disposal for long-time management of forest lands for both timber, and wildlife habitat.

The Department of Conservation has about 4,000,000 acres of land to manage. Obviously, the methods used must be applicable to large areas, biologically sound, and above all economically feasible. We must consider also that we are dealing with forest land where the soil and climate is generally unsuitable for growing the usual farm crops. The renewable resources are wood products and wildlife. The fact that wood products have a direct cash value makes it economically possible to manage the forest by regulated cutting so as to produce annual crops of wildlife.

Reviewing more than twenty-five years of studying and working with northern habitat it can be concluded that the young forest with its variability is most productive of wildlife, since the progress of natural growth at its optimum condition for wildlife can not be halted, cutting on as short a rotation as possible must be depended upon to produce the desired results. This will maintain a variety of age classes in the forest. Inter-planting of conifers in sparse aspen stands will provide winter protection and add more variety and eventually may permit alternate cutting periods for aspen and conifers on the same site.

OPENINGS

Openings are a necessary part of wildlife habitat. At the present time controlled burning is the most economical tool for maintaining them. But aerial application of herbicides is becoming a valuable accessory. Spraying can be done on areas that cannot be burned because they are too wet or because they do not support enough ground cover to carry a fire.

POOR FOREST LAND

Unmerchantable forest areas such as poor quality aspen (popple) that cannot be managed by commercial cutting can be improved for wildlife by controlled burning, herbicide spraying, disking, and possibly nonmerchantable cutting such as sportsmen's cuttings or mechanical cutting using a heavy crawler tractor equipped with a tree cutter blade. All of these tools serve to regenerate the stand by promoting sprout growth that provides browse for deer as well as more effective cover for most game species.

What Has Been Done

Tree and Shrub Planting for Wildlife (6,003,091 trees and shrubs; 55 species on 5,426 acres)

- 1931 First Planting: 10,000 each, white cedar, red pine, and jack pine
- 1932 Second Planting: Box elder planted on Leroy Club, Alpena County
- 1934 1,000 Acres planted to date aided by CCC labor.
- 1935 Hardwood Nursery established.
- 1931-1943 5,564,952 planted in eleven northern state game areas.
- 1944-1946 No planting during war years
- 1946 Complete check made on old plantings indicated almost complete failure of hardwood plantings due to poor sites or over-browsing by deer.

1947-1951 438,139 trees and shrubs planted on 332 acres.

Experimental plantings of multiflora rose not encouraging in the northern part of the state.

Current Cooperation with Forestry Division in proper distribution and size of pine plantations leaving suitable openings for wildlife, and research work to find better plant materials or new techniques that could result in a more successful program.

CUTTING

From 1940 through 1945 the Game Division carried on wildlife habitat improvement cuttings through timber sales on the old state game areas in northern Michigan. During this period sales averaged about 28,370 acres per year and totalled 141,835 acres.

On July 1, 1946 the Forestry Division was given responsibility for the administration of the old state game areas as a part of the over-all state forest system. Since then the Game Division has acted in a cooperative and advisory capacity on timber sales on all state lands under administration of the Department and with special responsibility for deeryard cuttings.

Deeryard cuttings are defined as any winter logging activity within the boundary of a deeryard or within one mile of the deeryard. See attached information circular No. 92, "Deeryard Management in Michigan" for details.

Since 1946 deeryard cuttings on state owned land have averaged a little over 33,000 acres each winter. And in the past four years the gross acreage under permit for deeryard cuttings has increased to about 50,000 acres per year.

CONTROLLED BURNING

The first controlled burning specifically to improve wildlife habitat was done in 1942. This test followed a two-year study of past forest fires which indicated that fire could be used to maintain open areas and to control the size and density of woody game cover.

World War II interrupted further testing, but in 1946, 1,495 acres were burned in five different locations. In subsequent years the amount of burning has varied and been limited a good deal by weather conditions. Up to and including the fall of 1957, 52 areas totalling 19,120 acres have been burned. (See attached "Status of Controlled Burning Projects"). So far this spring (1958) six controlled burns have been completed on 1,563 acres. Most of the controlled burning projects have been carried on to create and maintain openings for prairie chickens and sharptailed grouse, but during the past few years 15 burns (1,993 acres) have been made in non-merchantable forest stands, chiefly aspen, to create deer browse.

HERBICIDE SPRAYING

In 1952 an area of about 600 acres ten miles west of Grayling was sprayed by air using hormone type herbicides. The purpose was to create sharp-tailed grouse habitat by killing a fairly well-stocked area of poor quality aspen. Sprouts grew up from the top-killed trees in unanticipated profusion and the deer fed where practically no browse was available before.

Thus it was found that spraying herbicides could be used for the same purposes as controlled burning. The attached list "Herbicide Spraying 1952-1957" shows the purpose, areas sprayed, and acreage, which for northern Michigan is 9,261 acres sprayed by air in 63 different locations and four areas totalling 210 acres were sprayed with ground equipment.

DISKING

From 1954 to 1958 disking understocked stands of aspen to induce sprouting for deer browse and also to establish a better stocked stand was completed on 1,470 acres. See attached table "Northern Michigan Deer Range Improvement."

All of the programs discussed above are being continued, and most of them are being expanded as finances and economic conditions permit. In addition, new techniques such as direct seeding of woody plants, mechanical cutting of non-merchantable timber, herbaceous and woody plantings using new techniques or different species and others are being continually tested and will be added to the regular program if they prove to be feasible.

WILDLIFE HABITAT IMPROVEMENT ON SOUTHERN MICHIGAN GAME AND RECREATION AREAS

Since before 1940 the Department of Conservation has been acquiring lands in Southern Michigan to be managed primarily as hunting areas. These lands make up our present state game areas, 45 of which are included in this section of the report and total 144,866 acres of land. It is on these areas where most of the wildlife habitat development reported in this section has taken place. In addition to the above, there is also a habitat improvement program in progress on 13 Southeastern Michigan Recreation Areas.

At the start, habitat improvement centered largely around the planting of trees and shrubs to break up large abandoned fields. The early program, using mostly red and jack pine, was successful. It was soon noticed, however, that as acquisition continued and public ownership increased farming was eliminated and without feeding areas near the pine cover, wildlife did not increase as it was hoped it would. Where shrubs were present or where corn or some other food plant was growing near the pine strips, evidence of the presence of game species in satisfactory numbers could be noted. To provide a food supply along with the relatively easy to get pine cover, a variety of habitat improvement techniques are now being used, the selection of any one or more of which depends upon the deficiencies in the food and cover present and the kind of game to be encouraged.

The habitat improvement program presently being used on the publicly owned lands in Southern Michigan is designed to eliminate the deficiencies that exist in the natural food and cover. Each area is carefully studied by a Game Biologist to determine its potentialities and limitations. Then if improvements are needed, a plan is prepared. Improvements are designed to supplement the natural food and cover on the area to make it fully meet the requirements of the game species to be encouraged with a minimum expenditure of effort and money.

For example - if cottontail rabbits present the best management opportunity on an area, there are several techniques that can be used to improve the habitat and produce more rabbits. The logging of a woodlot with its resultant brush piles, abundant sprout growth and fallen unusable logs generally provides very desirable habitat for rabbits. Cutting where it can be used is normally the best and most economical management practice for cottontails. In most cases, this type of management also improves the woodlot for ruffed grouse and squirrels also seem to like more open woodland, providing a few den trees and mast producing trees are left.

If the timber in the woodland is not of saleable size or species, other methods must be used to achieve the desired results. Where labor is available merely cutting inferior trees and letting them lay where they fall has produced very good rabbit habitat. This is especially true if the tree can be felled on a grapevine or other tangle. In other areas herbicides have been used to produce similar results. The tops of trees and shrubs are killed when treated with herbicide, producing more open areas, encouraging ground cover and young woody growth, and in general making the area more attractive to wildlife. There is some objection to the use of herbicides by some who do not like to see dead trees and shrubs, but after a few growing seasons it is almost impossible to tell that an area has been treated. Herbicide sprays are not used for habitat improvement along heavily travelled roads where the results will be seen by a large number of people.

In some select areas bulldozers have been used to push over trees to produce brush piles, and create small openings around them, or to clear strips in heavily wooded areas which are then planted to such desirable game foods as white clover or other legumes or food patches. In other areas heavy crawler tractors have been used to pull a very heavy disk to create long winding openings in heavy stands of aspen. Early information from studies being carried on by the Rose Lake Wildlife Experiment Station staff indicates ruffed grouse are responding well to the use of the heavy brush disk. These investigations are still in progress.

Where brush is light it is sometimes more practical to cut it with a heavy duty mower or a brush cutter. Either piece of equipment can be used to stimulate production of young woody growth to furnish food for cottontails, or periodic mowings combined with herbicide treatments can eventually produce a permanent grassy meadow which can be used for a food patch if occasion demands.

Where permanent openings in wooded areas are needed it is possible to maintain them using herbicides. After the original treatment and one or possibly two repeat treatments the tree and shrub growth is usually well controlled and very little effort is needed after that to maintain an opening. Most game species benefit from openings in wooded areas. Creating and maintaining them is a very important part of wildlife habitat management.

Some of the major wildlife habitat improvement techniques used on the Southern Michigan Game and Recreation areas are as follows:

Tree and shrub planting

This is probably the best known of the many habitat improvement methods used. Those who have made use of the state game areas are well acquainted with the pine and

spruce plantings that have been established. Some probably have not noticed the less spectacular shrub plantings. Both types of woody plantings have a very important part in wildlife habitat improvement. Pine and spruce are most useful as cover. Shrub plantings, which are more difficult to successfully establish, furnish both food and cover. It has been found that it is possible to obtain very successful shrub plantings if the shrubs are cultivated for one, two, and sometimes three years. Shrubs given good care can produce game cover in two to three years. It may seem odd to some that the planting of trees and shrubs continue in light of the fact that we are also endeavoring to control woody plants with herbicide. The problem is - to have woody cover where it is needed. If there is too much, then it must be controlled. If there is too little, then a planting program is needed. The most common conifers used are red pine, white pine, jack pine, austrian pine and white spruce. Some of the more commonly used shrubs are multiflora rose, tartarian honeysuckle, Siberian crab, coral-berry, silky dogwood and nannyberry. Mast or nut producing trees and shrubs are used and preferred where conditions are satisfactory for their growth.

Food patches and meadow seedings

At the present time the establishment of food patches and meadow seedings is a major effort on the game areas. The placing of highly desirable food patches in strategic locations serves several purposes. They tend to hold game on state land where it has good cover and can nest without danger of having nests destroyed by farming operations. By having attractive food patches on state lands, game is more inclined to use the areas during the hunting season, making it more available for the hunter. The aim is to produce game habitat on state lands that is more attractive to game than that on private lands. During severe winters food patches in close proximity to good cover can materially increase game animal survival.

Along with and perhaps more important than the food patch is the meadow which offers nesting cover, food, and shelter for game species. Upland game species prefer various clovers, alfalfa or sericea lespedeza in narrow winding strips adjacent to other types of cover or other types of development.

Cuttings

The utilization of merchantable timber on the game areas will steadily gain in importance as woodland areas mature. The logging of an area is the cheapest and at the same time one of the most effective ways to make an area more productive of game. Most mature trees, except mast producing species and den trees do very little for game but the brush and sprouts that are the fruits of a logging operation produce optimum conditions for wildlife.

Edge development

This is a type of development that seems to have no ending. It is known that wildlife prefers those areas where there are changes in the type of cover. For example, along the edge of a woodlot and a cultivated field desirable habitat may be found providing there is some good shrubby cover between the field and the woodlot. To provide this shrubby cover, trees are lopped along the edge. Along grown up fence rows, older trees that no longer are useful to wildlife can be lopped to produce better game cover.

Using a heavy crawler tractor equipped with a blade similar to a Crossville tree cutter blade it will probably be possible to accomplish considerably more of this type of development work at a lower cost. Edge may be developed anywhere. In wide open country edge development could consist of planting strips of trees and shrubs adjacent to sericea lespedeza plantings or along the edges of food patches and meadow seedings to provide needed woody cover. This technique has been commonly used on the game areas.

Orchard development

Orchard development is another habitat development technique. It consists of combinations of several kinds of development. Formerly it dealt mainly with the pushing over or lopping of fruit trees in numerous abandoned orchards located throughout the state owned lands. Often a little pruning will improve the yield of fruit which is usually a good source of preferred wildlife food. Other trees besides fruit trees may be used. If a tree is about dead, it may be more valuable if it is pushed over to make ground cover. A tree that is pushed over may send up numerous sprouts, making valuable cover and food for wildlife. By planting wild grape, multiflora rose, and other shrubs around felled trees and planting clumps of conifers in close proximity to them, the area can become a thick tangle in a few years. When the opportunity permits, the planting of clover meadows and corn or buckwheat food patches adjacent to old orchards completes the development.

Brush pile construction

Brush piles are usually the by-product of some other operation. Whether they are a by-product or whether they are intentionally made, brush piles are very attractive to game species - especially cottontails. When properly located in conjunction with other development, brush piles form an important part of the complete picture of habitat development. The construction of a brush pile is not exactly simple if its usefulness is to be prolonged. Large logs, timbers, or stumps should be placed in the center of the pile and smaller brush piled on top. Large piles of brush are more effective than small piles because they offer game more security and last longer. Piles located adjacent to marsh or woodland areas, with a meadow and food patch close at hand, are more likely to be used than one located in an area with no food or other cover nearby.

Herbicide spraying

The control of trees and shrubs is very important in wildlife habitat management. Where conditions are satisfactory for its use herbicide is a useful and economical tool for this purpose. Properly used herbicides can maintain a young or an uneven aged stand by killing out the undesirable trees with 2,4-D or some other herbicide. This makes it possible to maintain a condition or age class in the woodland that is most desirable for wildlife. Herbicide is applied either from the air or with ground equipment. Where conditions are right, it is most economical to use a plane to apply the herbicide. When properly handled, it is possible to maintain openings, stimulate young growth along woodland borders, create new openings in woodland, and set back the succession, using herbicides alone.

Mechanical cutting and clearing

Probably one of the most effective means at the disposal of the wildlife habitat developer in upland game management is the use of the crawler tractor equipped with any one of a number of useful tools. It is possible to clear openings in wooded areas with very little effort, and within one year produce a very desirable habitat for game. The root rake, tree cutter blade, brush disk, and bulldozer blade can all be used advantageously to produce openings, brush piles, and edge development. Some of this type of development has been completed and preliminary figures indicate that the technique is feasible. Since the use of heavy crawler tractors is expensive, care must be exercised in the selection of locations where this type of equipment is used.

Nest boxes and den construction

Nest boxes cannot be classed as a major development tool but in the overall development plan they have their place and fit into the scheme of things. If placed in good locations on water impoundments, they are utilized by wood ducks, and other den nesting species.

Where there is a lack of underground dens, it is possible to remedy the situation by building dens using drain tile. This is a rather inexpensive operation and has been an effective cottontail rabbit management technique particularly when used in conjunction with other management measures such as brush pile construction, edge or orchard development, etc.

Both nest boxes and dens are meant to be supplementary tools and not a major development method for increasing game.

Small water impoundments

The water impoundment program is a major one on the game and recreation areas. This type of development is dealt with in more detail elsewhere in this report.

Sharecropping

Wherever there is good and sufficient farmland available and farmers are interested in cropping the publicly owned lands, sharecropping becomes a very useful game management tool. It provides the area with a farming operation at little or no cost to the state and the state's share is left in the field to be harvested by game. Sharecrop fields aid in providing more desirable habitat for farm game species. One of the most important uses of sharecropping is in connection with the management of large waterfowl areas, especially for geese. The cost of farming areas of sufficient size for geese might otherwise be prohibitive. Under the present sharecrop policy, only the sharecropper's share of the corn or small grain is taken off the land. All the straw, cornstalks, grass-legume seedings, and the state's share of the corn and grain remains on the land. In some cases surplus corn and small grain is harvested for the state if nothing is to be gained by letting it stand in the field, such as rye planted for goose pasture or the residue remaining in a field of corn after the goose flock has migrated.

There can be no effective cut and dried method of habitat development. Each area presents different problems. Results achieved must be weighed against the cost, as

well as against the demands caused by increasing hunting pressure. Where land is scarce and the hunters many, a more intensive development program must be used. It is the business of those in habitat management to maintain the game lands at the highest level of game production feasible. It is questionable whether in Southern Michigan the luxury of having large areas of undeveloped game land can be indulged in to any great extent. The game area lands should be managed to serve the largest possible number of game animals and sportsmen. This means utilizing the entire area, not just scattered bits of good game cover the Department fell heir to when the land was acquired.

The information listed below presents an account of what has been accomplished to date on the 45 game areas and 13 recreation areas included in this report.

Total number of trees and shrub planted	9,883,631
*Acres of food patch and meadow seedings	16,966
Tons of limestone applied to crop fields	14,833
Number of brush piles constructed	11,113
Rods of edge development	8,969
Acres of openings created with equipment such as crawler tractors, brush cutters, mowers, and by axe	1,052
Acres treated with herbicide	3,336
Number of small water impoundments constructed	283
Total acreage in above impoundments	2,100
Number of nest boxes and dens constructed	772
Rods of old fence removed	180,701

*An accumulative figure - some of this acreage includes fields whose acreage may be in the total more than once. A good example is corn food patches which may be renewed every 2 or 3 years with the same acreage being reported each time.

In addition to the above figures, between 2,000 and 3,000 acres of farmland is sharecropped each year. This sharecropping acreage should rise as new waterfowl areas in the Shiawassee Flats, Fish Point, and St. Clair Flats areas are completed.

Costs of Habitat development

Some of the average costs given below are low in some areas and high in others. Where inmate labor is available the job can be done at a low cost. In areas of high labor costs development costs are higher.

Tree and shrub planting costs about \$35.00 a thousand. Of this amount, about \$21.00 is for the purchase of stock and \$14.00 for labor to prepare the planting site, plant the trees and shrubs and cultivate the shrubs. The labor costs to plant trees has been materially reduced since machine planting and cultivating has been adopted but the cost of planting materials has continued to rise. Food patch and meadow seedings average about \$27.00 per acre. About \$2.00 of this total is for lime. Some of the higher costs have been caused by the increased activity in waterfowl development. It is expensive to break up new areas for the first time but after they are once broken and cleaned up it is expected that sharecroppers will do the actual farming. This should reduce the food patch costs considerably.

Other costs of interest are for brush piles, about \$2.00 each; edge development, about \$0.44 per rod; creating openings in heavy stands of timber, about \$11.00 per acre; treating trees and shrubs with herbicide, about \$7.00 per acre; nest boxes for wood ducks and artificial dens for cottontails, about \$4.00 each; and the removal of old fence, \$0.20 per rod.

It should be kept in mind that the costs reported here are for actual acreages treated. The acreage improved is much larger. For example - a one acre opening in a wooded area may improve ten or more acres, and a one acre food patch could attract game animals a quarter of a mile or more. No attempt is made to estimate just how much acreage is improved but it is considerably greater than the actual area as reported here.

FARM GAME RESTORATION PROGRAM

Farmers, more than any other group of persons, have the best opportunity to enjoy contact with their wildlife neighbors and directly influence the lives and production of this crop for others.

Many farmers appreciate wildlife enough to encourage it; some ignore it. The kind of farming a man carries on will determine to a great extent whether wildlife will thrive or barely get along on his land. Modern game management and good farming should go hand in hand. Good farming practices tend to improve food and cover for wildlife. Cover must be suitable for nesting and must provide adequate escape from natural enemies and protection from the elements. There must be available food and suitable cover for all seasons of the year. Where food and cover do not exist in adequate amounts, nor in the proper pattern, the problem of producing more of the desirable species of wildlife becomes one of improvement or restoration of habitat.

The Conservation Department, years ago, recognized the need for more game for an ever-increasing number of hunters. Many things have been tried in an attempt to produce a larger population of rabbits, pheasants, squirrels, and other game.

The Michigan Department of Conservation started a program of habitat restoration on private farms in the southern part of the state in 1948, as a Federal Pittman-Robertson Project. Under the plan, the Conservation Department enters into agreements with private landowners in a cooperative program of wildlife habitat improvement and provides free planting stock, seed, and fencing materials for farms throughout the

pheasant range of southern Michigan. The Department has also entered into working agreements with 39 Soil Conservation districts throughout this region in order to make use of certain facilities and contacts with farmers already made by these established districts.

Game biologists contact private landowners that have expressed an interest in wildlife management and a desire for technical services. The farm planners inspect the farm, inventory existing food and cover plants, and prepare a wildlife management plan designed to correct habitat deficiencies. This program fits in nicely with recommended soil and water conservation practices, and is mutually agreeable to the owner or operator of the farm.

Typical places on which the farm planner may recommend food and cover plantings are fence rows, gullies, eroded hillsides, edges of marshes, drainage ditch banks, windbreaks, pond borders, edges of woodlots, and odd corners not suited to the usual farm cropping. Some of the trees and shrubs provided for the places listed are: Pines, spruces, nut trees, multiflora rose, arrowwood, coralberry, fragrant sumac, highbush cranberry, bush honeysuckle, and nannyberry. A plan of the farm is made with a listing of the kinds and numbers of trees and shrubs best suited to the farm. It is then submitted to the farmer for approval.

Since the program was designed to benefit southern Michigan farm game located generally south of the Bay City-Muskegon Line, most of the shrubs provided for food and cover are adapted to growing conditions characteristic of the southern part of the state. The planting materials cannot be used for landscaping around buildings. Small lots located in or around towns or villages containing less than 5 acres are not considered under the program. Under the present policy of the Department there is a limitation of \$100 per farm for planting stock and other materials.

An agreement between the Conservation Department and the landowner, which can be modified or terminated by mutual consent, contains the following conditions:

THE CONSERVATION DEPARTMENT AGREES TO:

- (1) Assist in carrying out the habitat improvement work by furnishing the landowner with a wildlife management plan.
- (2) Provide at no cost to the landowner such trees, shrubs, seeds, and other materials as may seem desirable to make the farm more attractive for wildlife.

THE LANDOWNER AGREES TO:

- (1) Protect designated areas under improvement from grazing, burning, or other forms of destruction for a period of ten years.
- (2) Plant and maintain materials provided by the Conservation Department.
- (3) Make no direct charge for hunting privileges. The right to grant or refuse hunting privileges shall remain with the landowner or lessee.

Three-fourths of the money involved in the program is derived from a Federal tax on sporting arms and ammunition. The money has been made available by the Pittman-Robertson Act. The remaining quarter of the funds are derived from the sale of hunting licenses.

Project personnel consisted of three game biologists or farm planners at the beginning of the project, and eventually was increased to six planners and a leader-- the size of the present working force.

During the past ten and one-half years, 5,761 farms have been planned and the following materials provided to the cooperating landowners:

MATERIALS PROVIDED 1948-58

<u>No. Farms</u>		<u>Deciduous</u>		<u>Rods Barbed</u>		<u>Food Plot</u>
<u>Planned</u>	<u>Conifers</u>	<u>Tr. & Sh.</u>	<u>Multiflora Rose</u>	<u>Wire</u>	<u>Posts</u>	<u>Seed Lbs.</u>
5,761	6,503,274	1,320,840	4,518,245	16,243	3,915	17,315

In the early days of the program, woven wire fencing and posts were provided to cooperators. Stock was delivered by truck or car. The recent trends have been away from wire fences and toward living hedges. Most of the stock deliveries have been speeded up by using parcel post or express.

New prospects are obtained by means of news releases, radio and TV programs, and cooperation with other land use agencies such as the Michigan State University Extension Service and the Soil Conservation Service.

One of the apparent benefits that has resulted from the Farm Game Restoration Program has been the friendly feelings developed between the farmer-cooperators and the Department of Conservation. The farms of cooperators are generally open to hunters who first ask permission to enjoy this form of recreation. Many favorable reports have been received by the Game Division (during the severe weather of the past winter and early spring) concerning the use of food and cover plantings on cooperator's farms. The popularity of multiflora rose as hedges and wildlife travel lanes is demonstrated by the continuous demand for planting stock after ten years' trial in southern Michigan.

Game biologists working on the program have cooperated with the Game Division's research projects designed to evaluate the benefits, of food and cover management on private farms, for wildlife. Results of the evaluation are still very tentative and incomplete and considerably more time and effort will have to be put into the study before definite conclusions are justified. To get the needed information a considerable portion of the time of farm planners will be diverted, at least during the fiscal year starting July 1, 1958, to studying the results of the program instead of the usual farm planning activities. This, together with the work and direction supplied by the Research Section, should establish a number of basic facts that will permit a more realistic appraisal of the effects of the Farm Game Restoration Program. It is realized that a true and complete evaluation will be very difficult if not impossible to accomplish. So many of the possible benefits are indirect or intangible and it is highly questionable whether these benefits can all be recognized and accurately appraised. Some of the factors that can be included in the indirect or intangible benefit category

are: How many farms remain open to public hunting as a result of this program that otherwise might have been closed? What effect has the program had on farmer sportsmen's relationships? What have farmers done to benefit wildlife as a result of interest developed through this program and what will they do in the future? How many farmers in addition to the actual cooperators have practiced better game management because of the demonstrations provided on cooperator's farms? How many woodlots will be protected from grazing and how many marshes will be left unburned that would have been burned or grazed if it hadn't been for the Farm Game Restoration Program? The list of indirect and intangible benefits could be much longer but the above will serve as illustrations.

Even the direct benefits as determined by the number of additional pieces of game produced will be difficult to measure. Game numbers are affected by so many factors in addition to habitat such as weather, cycles, etc. and exact numbers of birds or animals are difficult to census. Limitations in the accuracy of census techniques makes it particularly difficult to measure the results of limited habitat improvements on a large number of widely scattered farms.

The work done to date in an attempt to evaluate this program gives the following indications:

1. A high percentage of the farmer cooperators do a good job of complying with the plans provided by the Game Division. That is, the stock received is well taken care of prior to planting, planting is carefully done according to recommendations and cultural treatments of the planting areas before and after planting is reasonably well done. During the years 1955-57 the degree of compliance was checked on 1883 farms for which plans and planting stock were furnished. It was found that 1586 of the farmers or about 84 per cent rated good, 206 or about 11 per cent were fair and 91 or about 5 per cent were poor on the basis of over all compliance.

2. Based on a random sample of 300 farms where plantings were made from 1949 to 1952 and checked during the summer of 1953, survival rates were as follows:

- (a) Multiflora rose had the best survival rate (about 84%) of all trees and shrubs planted.
- (b) About one half of the conifers planted, mostly pine and spruce, survived.
- (c) Survival of shrub plantings was generally low. Highest survival (30%) was that of coralberry. Survival of between one-half and two-thirds of the honeysuckle and coralberry plantings is so low that the plantings can probably be regarded as of little value. Two-thirds or more of other shrubs species planted survived so poorly that they are of little or no direct benefit to wildlife.
- (d) Spring conifer plantings consistently show better survival than fall plantings.
- (e) Multiflora rose has low survival on poorly drained sites.
- (f) Planting in furrows yields better conifer survival than scalping.

- (g) Relatively little maintenance work was done for most species. About one-third of the multiflora rose plantings received some cultural treatment.
- (h) More than one-quarter of the multiflora rose plantings were subjected to grazing, but on only rare occasions had they developed into satisfactory living fences.
- (i) Nearly two-thirds of the farms studied had less than 1000 stems of surviving planted stock.

3. Sixty of the above farms were rechecked in 1957 and the following results noted:

- (a) Multiflora rose - very little natural mortality when protected until well established; it will survive but not increase growth once grass competition is established; good growth can be obtained by proper care throughout southern Michigan (seven stock proof fences in six counties from Lenawee to Isabella were observed); spreading occurs but is seldom serious.
- (b) Other shrubs - Coralberry and honeysuckle had same survival rate in 1957 as in 1953; coralberry averaged about two feet in height and honeysuckle a little over four feet; two few sites were checked in the case of seven other shrub species to justify definite conclusions but four of the species showed improved survival over 1953 and three species showed higher mortality than in 1953; the general picture for shrubs was poor with an occasional excellent exception.
- (c) Conifers - Red, white and scotch pine and norway spruce had about 14.5% additional mortality between 1953 and 1957. Losses were due to heavy competition, pasturing, fire and mouse damage. Poor growth in some cases could be attributed to insect damage especially on red pine, to frost damage especially on norway spruce and competition or shade. Scotch pine is the fastest growing, averaging over five feet tall. It was also considered by biologists to have the best vigor, least disease and provide the best game cover of the conifer species checked.

It should be pointed out that a wildlife habitat improvement program such as the Farm Game Restoration program cannot be accurately evaluated on the basis of survival counts alone. In some cases spreading types of plants such as coralberry, dogwoods, etc. will spread after establishment and may within a few years produce a fully stocked stand even though mortality at planting time was heavy. Also in some cases low survival of planting stock results in a clumping effect, that is, trees or shrubs occur in clumps or even as individual specimens with grass and other herbaceous cover between. This frequently results in about as good game cover as a solid stand and if nesting cover is a limiting factor on the farm it may be even better than a solid stand. As long as the stand of plants is sufficient to discourage the farmer from cropping, grazing or burning the planted area, a large portion of the wildlife benefits probably will be realized, but if the farmer breaks up the area because of the poor stand and uses it for other purposes then, of course, all is lost.

It should also be pointed out that constant attention has been given to improving the program. Many species of plant materials that gave unsatisfactory results were dropped from the list of species furnished to farmers. As the need for better cultural treatment of planting sites was indicated farmers were encouraged to provide better treatment. Also as farm planners obtained more experience, the quality of the planning improved. These factors undoubtedly result in better plans which, if properly installed and maintained by the farmer cooperators should produce better plantings and eventually more wildlife.

Results of this habitat improvement program in numbers of additional game animals produced is difficult to determine and up to this time a very meager amount of such information has been collected. There are a large number of observations of wildlife using the improvements for nesting, roosting, feeding, loafing, as travel lanes, etc., but whether or not such use has actually increased the amount of wildlife on the farm and in the vicinity has not been determined. During the past winter when the weather was cold and steady with a moderate cover of snow there were many observations and reports of wildlife using the plantings, especially pheasants feeding on multiflora rose. These observations indicate at least that the animals preferred the planted food and cover to other types that were available but whether or not they survived in greater numbers because of the plantings is not known.

Attempts to determine the difference in pheasant populations on improved and unimproved farms by crowing cock counts did not show significant differences. This may have been because of the limited size of the plantings and the scattered location of the improved farms. In order to use this method of censusing, a number of farms should be improved in a solid block and this area compared to a similar area without improvements after the plantings had grown large enough to be effective.

During the past spring (1958) attempts were made to determine rabbit populations of planted areas as compared to other idle land on the farm. This was done on a sampling basis by establishing plots in the plantings and on the idle land on the farms and counting the rabbit pellets on the plots. Counts were made on 200 farms. The counts showed that rabbits used the planted areas about four times as much as they used other idle land on the cooperators' farms. The "other idle land" consisted of fencerows, swales, woodlots, ditch banks, etc. Multiflora rose produced consistently high counts and reflected heavy use primarily for winter food and also perhaps for travel lanes. No attempt was made to connect the amount of use with the quality of the planting but for now it can be said that rabbits make moderate use of the plantings in general and heavy use of multiflora rose.

As stated at the start of this discussion on evaluation of the Farm Game Restoration Program the results are still tentative and incomplete and do not justify definite conclusions either for or against the program. More time and effort will be put on this phase of the work and it is hoped that a more complete and accurate appraisal can be made within the next year or two.

A good appraisal of any program must relate benefits to costs. Throughout the ten years of operation of this program, expenditures have totalled about \$671,360.00 for an average cost of about \$122.00 per farm improved. These expenditures are on the basis of about 40 per cent for materials and 60 per cent for technical services. These costs include all charges against the project except the general administrative costs for such items as office space in the Lansing office, purchasing costs, supervision, etc.

Another element of the appraisal that must be considered in the final analysis is the length of time or the number of years that the accomplishments of the program will be effective. What might be an excessive cost when applied on an annual basis or for a limited number of years might be very reasonable if the improvements are effective over a long period. No definite period has been established for the effective life of various types of plantings. In the case of dams, dikes, etc. the estimated average effective life is fifty years, but for plantings some types will be effective longer than others. For example, shrub plantings may be effective almost indefinitely, whereas coniferous tree species may grow beyond their usefulness to wildlife in a comparatively few years. On the other hand, if the tree species are planted primarily as a mast or nut producing food source they may be of only limited value during the first fifteen, twenty, or more years after planting, but once they come into production they will be very useful for a very long time, perhaps 150 to 200 years.

Until a more definite appraisal of the Farm Game Restoration Program is available it is planned to continue it on about the same or a somewhat reduced scale as determined by the overall financial situation in the Department and particularly the Game Division. At the present time the annual budget for this program is about \$90,000.00. If further curtailment is necessary this program will undoubtedly be reduced to maintain a balanced program in so far as possible within the division.

Soil Bank

Recently the Department of Conservation has extended its cooperation with the Conservation Reserve phase of the Soil Bank Program in an effort to encourage active cooperation on the part of landowners in the Fish and Wildlife phases under this Federal Act. It is hoped to stimulate an active interest among the farmers of all counties of the state in helping to conserve the wildlife resources commonly found on farm lands. Many game management practices including food plots, meadow seeding, and tree and shrub plantings are cost-shared by the Federal Government. Since farmers own most of the land in the small game range of Michigan, production of such kinds of game as pheasants, rabbits, and squirrels lies largely in their hands. It is believed that this program has great potentials for producing a sustained yield of wildlife on these private farms.

Wildlife on the farm brings real enjoyment and a sense of satisfaction to those who have expended time and effort to perpetuate a continuous supply. Cooperation with the public agencies such as the farm forester, county agent, and the wildlife biologist can help the farmer make his lands more attractive to wildlife.

HABITAT IMPROVEMENT FOR WATERFOWL AND FUR-BEARING ANIMALS WILDLIFE FLOODING PROJECTS

The construction of flooding projects has been used in Michigan as a means of improving wildlife habitat since the middle 1930's. In 1934, with the aid of CCC labor and financing, the Mud Lake or Backus Lake project in Roscommon County and the Molasses River Marshes in Gladwin County were completed. These floodings have now been in use for well over twenty years. The Mud Lake project after a boom covering the first several years following flooding has tapered off in production of both fish and wildlife. This is attributed to changes in the plant life caused by a long period

of stable water levels. This project has been under intensive study by the Houghton Lake Wildlife Experiment Station for the past two years and this year the water is being drawn down to approximately its pre-flooding level. The bottom soils will be allowed to dry out and growth of a lush stand of plants on the exposed soils will be encouraged. When this and perhaps other management objectives have been accomplished the dam will be closed and the water level raised again. It is anticipated that through this type of management it will be possible to repeat over and over again the highly productive years in the early life of an impoundment. Water levels of the Molasses River Marshes in Gladwin County vary because of the limited water supply and reduced production caused by stable water levels has not become a serious problem.

In 1940 the Dead Stream area in Roscommon and Missaukee counties was flooded by construction of the Reedsburg Dam on the Muskegon River a few miles downstream from Houghton Lake. This has been a highly productive area for both game and fish, but it now appears that production is tapering off and that additional management measures, such as a drawdown and aeration of the bottom soils should be considered.

Wildlife flooding projects became a major part of the habitat improvement program in 1948 when the technique was set up and approved for financing with Pittman-Robertson Federal Aid Funds. Since then more than forty major projects in all regions of the state have been completed. (See table of Appendix) These projects, which include major water control structures, vary in size of the flooded area from 17 acres to more than 2,200 acres and flood a total area of about 16,851 acres. The cost of these floodings based on amount of the contracts for construction has been \$340,229.00 or about \$20.00 per acre flooded. These costs do not include land acquisition costs where it was necessary to buy additional land or engineering or administrative costs.

In addition to the major projects outlined above, 283 small water impoundments have been constructed on public lands in the game and recreation areas in the southern region of the state. These small floodings cover a total of about 2,100 acres for an average size of between 7 and 8 acres. The dams or dikes are of simple design and are constructed by Department personnel and equipment. Accurate records of the construction costs for these small projects have not been maintained but judging from the part of the costs charged to Pittman-Robertson accounts, a figure of \$20.00 to \$25.00 per acre would be near the actual average cost. To date, construction of small water impoundments has been limited to public lands in the southern part of the lower peninsula, but plans have been made to expand this type of habitat improvement into a state-wide program.

The area flooded by wildlife flooding projects of all types totals over 23,350 acres.

On the whole, wildlife flooding projects have produced quite spectacular results. Because of careful selection of sites to be flooded the resulting habitat has proven attractive to breeding ducks and in nearly all cases has been occupied almost immediately after development. Brood production has been more than satisfactory and on many projects, particularly the larger ones, local ducks have been supplemented by migrants during the fall season and opportunities for successful hunting trips have been increased.

Opportunities for good flooding projects depend on a number of factors, such as the lay of the land, ownership of the land, the water supply, fertility of the land to be flooded, engineering feasibility, cost, and others. These factors limit the number of impoundments that can be built, but in Michigan there still is a large number of desirable sites to be developed and this program is expected to continue, as finances permit, throughout the foreseeable future.

Experience has shown that in some cases the people, particularly those living in the vicinity of wildlife floodings, are disappointed with the finished projects. Those not familiar with the requirements of waterfowl and fur-bearing animals allow themselves to visualize the proposed project as a large beautiful lake. Consequently, when the dam is built and the water level raised they are sometimes disappointed to see a shallow water area with much emergent vegetation, dead timber that was not removed prior to flooding, no bathing beaches or large open water areas for boating or fishing. It is granted that it would be nice if it were possible to satisfy all of the recreational interests in water on the same area, but it seldom is. The most satisfactory water depths for waterfowl and fur-bearing animals normally are less than six feet. Consequently, only the margins of deep water areas are used, except as resting water. Also human disturbance caused by boating, bathing, etc. discourages waterfowl from remaining in the vicinity of these activities. It is usually not feasible to attempt to build all-purpose impoundments and expect to have waterfowl using them in numbers. In a few cases, however, very good fishing and waterfowl breeding and hunting areas have been maintained by the same dam. In such cases fishing is usually best in the deeper waters and the waterfowl and hunting use is greatest in the shallow weedy and brushy parts of the impoundments. Where these possibilities were recognized in a proposed impoundment, they have been financed jointly by Game and Fish funds.

In recent years, with the constantly increasing number of waterfowl hunters and the steadily decreasing amount of suitable habitat, in spite of all efforts to develop new areas, it has been recognized that in order to maintain satisfactory waterfowl numbers each acre must be made to produce more. In other words, the quality of the habitat as well as the quantity must be considered. As a result, major projects to improve the quality of habitat at such important waterfowl areas as St. Clair Flats, in Lake St. Clair, Fish Point near Sebawing, and Fennville - Swan Creek have been started or are contemplated. These areas are planned to combine controlled water level areas with sizeable sharecrop farming operations. In this way the needs of the birds for rest water, a large quantity of high quality feed, and adequate protection can all be furnished on a comparatively small area. Up to this time only one such area has been developed in Michigan in addition to the Swan Creek - Fennville area which has operated more or less along these lines for several years. The developed area is a 160-acre tract in the Fish Point Wildlife Area on Saginaw Bay. Developments consisted of repairing old dikes on the tract and installing a pumping station that would pump water out of the area for drainage to make farming possible or pump water back into the area to flood the crops produced. The original dike pattern divided the 160 acres into two fields. At present one of the fields is managed as a permanent water area with water levels maintained by pumping when necessary. The other field is cropped and the crops flooded after they mature. Results obtained on this area during the two seasons since it was completed in late 1955 and continued heavy use of the farmed area at Fennville prove that high concentrations of waterfowl can be attracted if their needs for water, food, and protection can be met.

Construction work is already in progress to expand the controlled water and agricultural area at Fish Point to about 2,000 acres. Work is also in progress on a comparable project in the St. Clair Flats Wildlife Area and a controlled water level project of the same type, but smaller, will be built on the Maple River State Game Area a few miles north of St. Johns this summer. Because of the small size of the Maple River Project (about 200 acres) it is believed that this area can best be managed by wet soil cropping with such crops as smart weed, millets, etc. rather than attempt to sharecrop this limited area.

Another project designed to improve the quality of waterfowl habitat is now under construction at the Crow Island State Game Area. For the past several years it has been necessary to depend on high flows in the Saginaw River and high water levels of Saginaw Bay to maintain satisfactory water levels in this 1,000-acre marsh. With water levels in Saginaw Bay receding, this method of filling the marsh is no longer dependable. To insure proper water levels and desirable habitat, a 15,000 gallons a minute electric pump is being installed to draw water from the Saginaw River to maintain the marsh.

Work is now being planned to start this summer on the Kalamazoo River dike that maintains the Swan Creek marsh which is used as rest water by most of the geese in the Fennville - Swan Creek flock. As finances permit, this work will be expanded to include cross dikes within the marsh designed to increase the size and improve the quality of the marsh.

The largest and possibly the most significant waterfowl habitat development project now in progress in Michigan is the combination state and Federal project in the Shiawassee Flats Wildlife Management Area in Saginaw County. This project consists of the Shiawassee National Wildlife Refuge being acquired and developed by the U. S. Fish and Wildlife Service and an adjacent state game area. The Federal portion of the area is designed and is being developed to provide protection, a reliable food supply, and limited hunting, particularly for geese. The adjacent state area is designed and is being developed primarily as a public hunting ground. Developments on the state area, which have been in progress for about two years, include clearing a sizeable area now covered with swamp hardwoods; constructing permanent pool areas; ditching, diking, and installation of pumping stations to provide water control, and preparing areas for share-crop farming to provide an increased food supply. When completed this combination project is expected to include about 20,000 acres with about 50 per cent in state and 50 per cent in Federal ownership. Present progress indicates that the project will become operative within the next year or two, but several years of continued acquisition and development will be required before final completion.

Another interesting development for waterfowl has been made on what is locally known as the Bullock Ranch near Seney in the Upper Peninsula. This area is located near the Seney Migratory waterfowl Refuge operated by the U. S. Fish and Wildlife Service. Geese from the refuge were using privately owned fields in the vicinity for feeding and consequently the private owners were selling hunting rights and some years hunting was very good. After numerous attempts to buy these lands, to make the hunting available to the public, met with failure it was decided to attempt improvements on some of the lands already in state ownership to make them more attractive to the geese. The soils were very poor and the short growing season precluded doing much

more than the development of grazing areas. These developments consisted primarily of clearing off scattered trees and other woody vegetation, plowing or disking, fertilizing and seeding. Crops used were mainly rye and timothy. An earthen plug was placed in a drain ditch flowing through the area to provide a better water supply. These developments have been maintained and expanded by periodic replanting, breaking up new land and aerial spraying of herbicides to increase the amount of open area. During the three years these improvements have been in use they have successfully attracted geese and have increased the opportunities for free public hunting.

A new type of management for fish and game is now being tested on the Haymarsh Lake Wildlife Flooding in Mecosta County. This dam was built in 1949 and after a few years of high production especially for fish the production tapered off. The water in this impoundment was drawn down between mid May and early June of this year. About the tenth of June approximately 100 acres of the exposed mud flats were seeded to millet by aerial seeding. It is anticipated that the millet will produce a lush growth of vegetation as well as a seed crop. As soon as the millet has ripened or when the first killing frost occurs the dam will be closed and the water level raised. The vegetative growth that is flooded should fertilize the pond and increase its future production and the millet seed should provide a food supply for waterfowl during the fall migration this year and the spring migration next year.

Other management techniques such as seeding shoreline and shallow water areas with perennial plants of value for food and cover for wildlife, construction of nesting islands, and working up bottom soils to improve growing conditions are also anticipated.

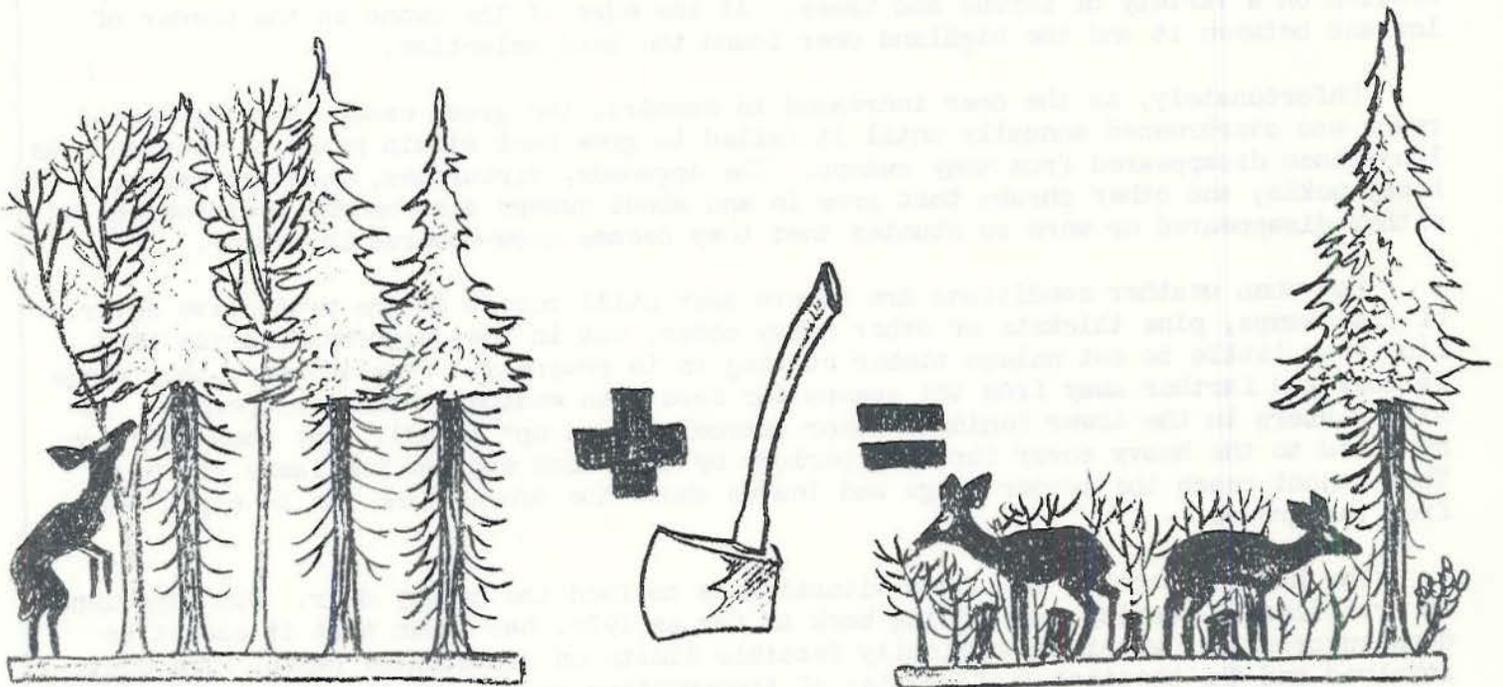
In the meantime the fish population has been concentrated in a few deep ponds that occurred on the area before flooding. It is expected that the predaceous fish such as pike will eliminate a large portion of the pan fish population which will eliminate overcrowding and stunting. If this test is successful, both hunting and fishing should be improved in the future, and additional periodic drawdowns should perpetuate the area in a highly productive condition indefinitely.

Another waterfowl habitat improvement technique is being used particularly on flooding projects and other extensive marsh areas where stands of sedge grass and cattails are too solid and extensive. This consists of aerial spraying of herbicides to open up the stands and create open water areas to make them more suitable. This technique is still in the field testing stage but results to date are very encouraging. Other techniques that have been tried on a limited scale and show promise for the future include development of nesting islands, removal of woody cover from portions of the shoreline of impoundments to permit freer use of adjacent uplands for nesting and feeding, and installation of loafing and nesting rafts. It is believed that these techniques and others can be used where needed and where the results will justify, the cost, to improve the quality of waterfowl habitat and make each acre produce more.

LAD:cga

6/24/58

DEERYARD MANAGEMENT IN MICHIGAN



Game Division

MICHIGAN DEPARTMENT OF CONSERVATION
Game Division

Information Circular No. 92
Revised May 9, 1958

DEERYARD MANAGEMENT IN MICHIGAN

Deer were scarce in Michigan 100 years ago. There were endless miles of dense forests of pine, hardwood, hemlock, and heavily timbered swampland. This wilderness was inhospitable both to man and beast. Dense shade produces no food for deer.

Logging permitted the sunshine to reach the ground and new, young growth provided abundant food. Deer as well as rabbits and grouse thrived upon it.

In Michigan's severe winters, deer herd together in heavy cover called deeryards. Where mixed conifer swamps occur, they have always formed the nucleus of our winter deer range. The evergreen cover provides shelter from winds and drifting snow. Deer can maintain runways and trails that are necessary in foraging for food. Cedar leaves and twigs used to be their favorite winter food for many years, although they have always browsed on a variety of shrubs and trees. At the edge of the swamp in the border of lowland between it and the highland deer found the best selection.

Unfortunately, as the deer increased in numbers, the green cedar that they could reach was overbrowsed annually until it failed to grow back within reach of deer and has long-since disappeared from many swamps. The dogwoods, virburnums, mountain maple, honeysuckle, and other shrubs that grow in and about swamps also became overbrowsed and either disappeared or were so stunted that they became snow-covered in winter.

Now when weather conditions are severe deer still resort to the protective cover of the swamps, pine thickets or other heavy cover, but in the overbrowsed areas they find very little to eat unless timber cutting is in progress. Consequently, they range farther and farther away from the swamps for food when weather conditions permit. In mild winters in the Lower Peninsula deer scarcely "yard up" at all. But when they are confined to the heavy cover for long periods by deep snow many of the fawns starve. They cannot reach the tender twigs and leaves above the browse line six to eight feet from the ground.

The humane reaction to such a situation is to feed the hungry deer. But experience in artificially feeding deer, going back as far as 1928, has shown that it cannot be done successfully within economically feasible limits on a statewide basis. The costs involved and the physical difficulties of transporting hay to all the distressed areas are prohibitive.

It is not sufficient to toss out a bale of hay here and there to take care of the deer for several weeks. The hay must be scattered out over a long feeding line twice a week. Once started feeding must be continued because it concentrates deer so that they are dependent on the hand feeding. In order to feed the fawns that need it most it is necessary to feed all the adult herd too. The older deer drive the smaller deer away from the hay. Yes, the does will chase off their own fawns if feeding places are limited.

Even if feeding could be successfully done one year the problem would only be increased in subsequent years by having more and more deer to feed.

The Game Division began recommending additional harvest of deer some twenty years ago as the first logical step in the management of the deer herd and its range. Attempts to plant trees and shrubs for deer browse in the winter range were thwarted not only by poor growing sites but also by the deer themselves killing the planted seedlings before they could produce any appreciable quantity of food.

From 1935 to 1940 experimental release cuttings were made in deeryards in four of the old state game areas, on Drummond Island, and in the Black River State Forest. The cuttings were made on two-and-a-half acre alternate plots so that adequate protective cover remained. Cutting specifications were varied from one plot to another in order to determine the most suitable methods of cutting. The work which was carried on with CCC labor was done in winter so deer could feed on the tops. The results were encouraging and indicated that logging operations could be an important factor in the management of deer range.

Prior to 1940 while the second growth was growing up year by year, very little logging was done on state-owned lands. But since then, from 1940 to and including the winter of 1957-1958, we have had timber sale permits in deeryards or within a mile of them covering about 570,000 acres.

These cuttings carried on in winter are called deeryard cuttings and they have been made on the upland surrounding the swamp as well as in the deeryard itself. Cuttings up to one mile from a swamp deeryard are within the deer's range most winters. The logging activity provides a large quantity of food from the tops readily available to the deer, but the regrowth of sprouts of aspen (poplar), birch, ash, maple, and a variety of shrubs provides even more browse for several years afterward.

There are approximately 2,450,000 acres classified as deeryards in the state. The state owns slightly less than one-third or about 700,000 acres. Therefore, when someone looks at an overbrowsed swamp and wonders why the Conservation Department does nothing about it, the chances are two to one that the state does not own it. If that particular part of the swamp has a good merchantable stand of cedar, spruce, and balsam, the chances are perhaps ten to one that the state does not own it.

Providing natural food for deer by timber sales is not only economically feasible but it is better for the deer. There are all-too-many records of dead deer on and around hay piles. From our deer feeding experiments at Cusino we have learned the number of pounds of various kinds of natural browse needed per deer per day to carry them through the winter. We have also determined how much deer food per acre is made available from the tree tops by cutting in the hardwoods, aspen, jack pine, cedar swamp, etc. In this way we can determine how many extra deer our deeryard cutting program will carry through the winter. For example: one acre of hardwood that is cut will carry, on the average, one deer for 90 days. Explained further, one deer will eat about $4\frac{1}{2}$ pounds of browse every day. In 90 days it will have eaten 405 pounds. That is just about the amount of browse made available by cutting one acre of hardwood timber. In like manner one acre of mixed hardwoods and conifers that is logged will make enough browse available for three extra deer over winter. And one acre of cedar swamp when cut is capable of providing food for five extra deer for the yarding season.

We find that the average cutting (all types) produces browse for 2.6 deer per acre actually cut. Actual cutting is done on 13 acres per forty under permit. Thus each forty acre deeryard cutting provides browse for 33.4 extra deer that the area could not support during the winter without the cutting. In view of the fact that occasional cuttings are not used by deer and some not fully utilized it has been estimated that deer do actually eat 75 per cent of the browse from the tops. Therefore, the cuttings actually carry 25 extra deer per forty of deeryard cutting.

Furthermore, the sprouts and reproduction following the cutting (which after all is the goal in deeryard management) is more important and productive deer food for several years than the cutting itself. Similar calculations show that the regrowth will provide browse for at least three times as many deer as do the tops or 100 extra deer per forty acres. Here again not all of the regrowth is utilized and our best estimate is that perhaps only 50 per cent is actually utilized which means that 50 deer per forty are carried by the regrowth.

Number of Extra Deer Carried by the Deeryard Cutting Program
(based on 75 per cent utilization of the tops and 50 per cent utilization of the regrowth)

Year	Acres	Forties	Extra Deer		
			Tops	Regrowth	Total
1953	22,040	542	13,550	27,100	40,650
1954	38,430	960	24,000	48,000	72,000
1955	47,555	1,189	29,725	59,450	89,175
1956	51,948	1,299	32,475	64,950	97,425
1957	58,223	1,455	36,375	72,750	109,125
1958	47,279	1,182	29,550	59,550	88,650

It is unfortunate that cedar and other conifers do not sprout. Regrowth of conifers following logging depends on the germination of seed and successful growth of the seedlings. This growth is slow compared to sprouts. There are many deeryarding swamps in which the state owns very little merchantable timber. This is especially true in the Lower Peninsula. In such cases, prior to our special deer seasons we were reluctant to cut because it was almost certain that deer would kill any cedar reproduction that germinated from seeds following the cutting. This has been demonstrated in many places.

The fact that deer naturally seek the protection of conifer cover in severe weather poses a difficult problem of obtaining successful cedar reproduction even with reasonable deer herd control. However, new deeryarding cover is developing continually in the older pine plantations. Approximately 150,000 acres were planted on the various state forests prior to 1936. A comparatively large area also is developing on the national forests. Increasing use of these new wintering areas may relieve the browsing pressure on the swamps enough to allow successful reproduction of cedar following cutting in the future.

Management of the state-owned land in and adjacent to deeryards has consisted almost entirely of cutting. The fact that the timber has a direct cash value makes it feasible and economically profitable. The work is done by private loggers who operate under a permit issued by the Department and who cut according to specifications worked out by game supervisors and foresters.

Other methods of deeryard management that supplement the cutting program are controlled burning and herbicide spraying. Both methods are being used to regenerate non-merchantable stands of aspen around deeryards. The sprouts of aspen following such treatment are browsed extensively by deer for at least two or three years and provide a large quantity of food where practically none existed before. Mechanical tree cutting with heavy equipment now available may become another useful tool in deeryard management.

We know the methods for good deer range management but the best of range management cannot succeed without adequate control of the deer herd. The two go hand in hand. There is a limit to the amount of food the range can produce and consequently a maximum number of deer that can be maintained year after year.

MICHIGAN DEPARTMENT OF CONSERVATION

Game Division

Status of Controlled Burning Projects
as of February 17, 1958

County	Approved Projects Pending Completion		Projects Completed	
	No.	Acres	No.	Acres
Alger	-	--	6	795
Alpena	-	--	1	80
Arenac	1	160	2	287
Baraga	-	--	2	115
Cass	2	4	1	8
Clare	-	--	1	15
Delta	-	--	1	120
Dickinson	-	--	6	3,762
Gladwin	1	47	5	864
Houghton	-	--	1	300
Iosco	-	--	1	560
Kalkaska	1	210	2	1,340
Lake	-	--	1	80
Mackinac	-	--	3	375
Marquette	1	30	1	262
Missaukee	-	--	2	915
Montmorency	-	--	1	40
Ogemaw	-	--	1	140
Ontonagon	1	300	-	---
Oscoda	-	--	1	1,200
Otsego	-	--	4	2,834
Roscommon	-	--	1	320
Schoolcraft	-	--	4	4,667
St. Clair	-	--	2	36
St. Joseph	-	--	2	5
Totals	7	751	52	19,120

SUMMARY:

Region I	24 areas burned - 10,396 acres
Region II	23 areas burned - 8,675 acres
Region III	5 areas burned - 49 acres
Totals	52 areas burned - 19,120 acres

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MICHIGAN DEPARTMENT OF CONSERVATION
Game Division

HERBICIDE SPRAYING 1952-1957

Aerial Spraying:

<u>Region I</u>	
Sharp-tailed grouse	17 areas - 5,415 acres
Ruffed grouse (Misc.)	<u>1</u> area - <u>25</u> acres
Sub-totals	18 areas - 5,440 acres
<u>Region II</u>	
Sharp-tailed grouse	6 areas - 1,500 acres
Deer browse	30 areas - 1,912 acres
Misc. Waterfowl, woodcock, etc.	<u>9</u> areas - <u>409</u> acres
Sub-totals	45 areas - 3,821 acres
<u>Region III</u>	
Wildlife openings*	18 areas - 2,152 acres
<u>State</u>	
Total aerial spraying	81 areas - 11,019 acres

*Includes 72 acres of cattail sprayed with dalapon.

Ground Spraying: (Creating and Maintaining openings)

<u>Region I</u>	3 areas - 155 acres
<u>Region II</u>	<u>1</u> area - <u>55</u> acres
Total	4 areas - 210 acres
<u>Region III</u>	Many areas - 2,200 acres (approx.)
<u>State</u>	
Total ground spraying	2,400 acres

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MICHIGAN DEPARTMENT OF CONSERVATION
Game Division

Northern Michigan Deer Range Improvement
Herbicide Spraying - Controlled Burning - Disking

Year	Herbicide Spraying		Controlled Burning		Aspen Disking*	
	No. of areas	Acres	No. of areas	Acres	No. of areas	Acres
1952	-	-	-	-	-	0
1953	-	-	2	239	-	0
1954	4	226	1	224	-	10
1955	6	460	5	480	-	413
1956	15	991	0	0	-	499
1957	5	235	4	753	-	548
Total	30	1,912	12	1,696	-	1,470

* The number of individual aspen areas disked each year is not readily available.

Costs:

Herbicide Spraying (aerial with 2, 4-D) about	\$3.50 per acre
Controlled Burning (equipment & impressed labor)	.75 per acre
Disking (equipment and labor) about	\$5.50 per acre

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MICHIGAN DEPARTMENT OF CONSERVATION

Major Wildlife Flooding Projects Completed

<u>Name</u>	<u>County</u>	<u>Year Completed</u>	<u>Acreage Flooded</u>
1. Big Mud Lake	Roscommon	1934	640
2. Molasses River Marshes	Gladwin	1934	850
3. Dead Stream	Missaukee & Roscommon	1940	2,170
4. Albion	Barry	1949	17
5. Sawdel Lake	Lapeer	1949	46
6. Chilson Pond	Livingston	1949	70
7. Hosley Pond	Livingston	1949	13
8. Potagannissing River	Chippewa	1949	2,220
9. French Farm Lake	Emmet	1949	802
10. Old Muskrat Farm	Tuscola	1949	120
11. Old Fur Farm	Clare	1949	263
12. Molasses River No. 1	Gladwin	1949	83
13. Little Fox River	Schoolcraft	1950	125
14. Molasses River No. 2	Gladwin	1950	200
15. Bear Creek	Roscommon	1951	273
16. Petobego	Grand Traverse	1951	250
17. Grass Lake	Benzie	1951	482
18. Net River	Baraga	1953	210
19. Swan Creek	Allegan	1952	140
20. Hancock Creek	Dickinson	1952	74
21. Tomahawk Creek	Presque Isle	1952	170
22. Featherbed Marsh	Mecosta	1952	425
23. O'Neal Lake	Emmet	1952	130
24. Beaver Lake	Roscommon	1952	100
25. Hayward Lake	Menominee	1953	1,800
26. Stoney Creek	Cheboygan	1952	190
27. Cannon Creek	Missaukee	1953	133
28. Mud Lake	Marquette	1953	190
29. Rainy River	Montmorency	1953	285
30. Denton Creek	Roscommon	1954	270
31. Blind Sucker River	Luce	1955	1,050
32. Headquarters Lake	Grand Traverse	1955	185
33. Molasses River No. 3	Gladwin	1955	590
34. Martiny Lake	Mecosta	1955	1,420
35. Robinson Creek	Roscommon	1955	490
36. Fish Point (field development)	Tuscola	1955	160
37. Connors Marsh	Crawford	1955	225
38. Backus Creek	Roscommon	1956	550
39. Black Creek	Mackinac	1956	820
40. Devil's Lake	Alpena	1956	900
41. Littlejohn	Mecosta	1957	70
42. Pickerel Lake Creek	Mecosta	1957	90
43. Dog Lake	Cheboygan	1957	520
44. Little Mud Lake	Roscommon	1957	550
TOTAL			20,361

Fish and Wildlife Flooding Projects Developed Jointly by Fish and Game Divisions

<u>Name</u>	<u>County</u>	<u>Year Completed</u>	<u>Acreage Flooded</u>
1. Haymarsh Lake	Mecosta	1949	250
2. Mud Lake	Grand Traverse	1957	645
TOTAL			895