

good about exotics and will until we apply science and common sense to the problem. Let's do it—and do it right.

NINE YEARS OF PROGRESS IN FARM GAME MANAGEMENT IN NORTH CAROLINA, 1948-1957

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INTRODUCTION

A statistical survey (PR Project 26-R) of the economic value of game and fish in North Carolina conducted in 1948 indicated that 51.2 percent of the sportsmen of North Carolina preferred to hunt farm game (quail and rabbit). As a result of this demonstrated interest, a great deal of emphasis has been placed on farm game management by the North Carolina Wildlife Resources Commission. The objectives of this paper are to (1) review the various stages of development of the North Carolina farm game program, (2) list some of the problems encountered and (3) summarize the results to date.

CONCEPT OF FARM GAME MANAGEMENT IN 1948

A state-wide investigation of wildlife habitat in North Carolina (PR Project 20-R) indicated that farm game populations were declining. It was apparent that there was a need for restoration measures to provide suitable nesting and protective cover and permanent sources of winter and spring foods. It was thought that this restoration could be accomplished by providing technical advice and distributing perennial planting materials to interested farmers and landowners. Perennials were chosen because they would furnish food and cover for a period of several years, thus making it possible to progress from one farm to another and eventually accomplish management on a state-wide basis.

The Wildlife Resources Commission was cognizant of the fact that most of the farm game in North Carolina was being produced on privately owned land and recognized that any management program, in order to be effective, must be designed to encourage and aid private landowners in managing their lands for farm game.

In 1948 the Wildlife Resources Commission initiated a Cooperative Farm Game Habitat Development Project. The objective of the project was to improve and maintain wildlife habitat on each of the 270,000 farms in North Carolina. It was thought that this objective could be accomplished if two separate approaches were made: (1) The establishment of demonstration areas, and (2) the state-wide distribution of wildlife food and cover planting materials.

DEMONSTRATION AREAS

Demonstration areas were to be developed in localities representative of the various physiographic regions of the state. Each such area was to be leased by the Wildlife Resources Commission for a period of five years and developed cooperatively with the landowner and the local sportsmen's or civic club participating.

The areas were designed to demonstrate accepted farm game management practices and planting techniques to landowners and sportsmen. A total of nine areas ranging in size up to 1,000 acres were selected for development the first year. Each area was posted with signs indicating that it was a Cooperative Farm Game Habitat Development Area and that hunting would be allowed only by permission of the landowner. The areas were cover-mapped and management plans were made. Management plans emphasized the use of bicolor

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and sericea lespedeza and multiflora rose planting materials. It was recommended that $\frac{1}{8}$ -acre patches of bicolor and sericea lespedeza be planted adjacent to each other along woodland borders, field edges, in odd corners of fields and in old tobacco plant beds, and that multiflora rose hedges be planted for the purpose of providing travel lanes between areas furnishing food and cover.

PROBLEMS ENCOUNTERED WITH DEMONSTRATION AREAS

Original plans for establishing farm game demonstration areas specified that they would be developed cooperatively by sportsmen, landowners, and the Wildlife Resources Commission. However, such cooperation was not obtained in a majority of the cases. Local sportsmen did not always furnish financial aid, equipment, and the necessary labor as originally promised. Farmers on whose land the demonstrations were to be established were often too busy to follow through with their commitments. In many cases wildlife biologists had to plant, fertilize, and cultivate the plantings that were established.

It soon became evident that the disadvantages of demonstration areas as such would outweigh the advantages. In some cases they became controversial issues between sportsmen's groups and landowners; they did not have the far-reaching educational effect expected; they did not result in cooperative development of all areas; their development devolved upon project personnel thus diverting time from the broader state-wide program of providing all interested landowners with technical advice and planting materials.

For these reasons, demonstration areas were discontinued in favor of providing interested landowners with technical advice pertaining to farm game management and food and cover planting materials.

STATE-WIDE PROGRAM

1949. During the first year of the program when emphasis was on demonstration areas, some individual farm development was accomplished. Materials distributed to these individuals amounted to 308,000 bicolor lespedeza seedlings and 44,000 multiflora rose seedlings. Project biologists contacted most of the farmer cooperators during the first growing season in an effort to determine the amount of materials that were planted and the percent survival. It was found that 94 percent of the materials distributed to individual landowners had been planted and were growing satisfactorily. The results of this preliminary evaluation were considered to be highly satisfactory and were used as the basis for expanding the program.

1950. During the second year, emphasis was placed on increased participation by individual farmers. Project personnel was increased from three biologists to ten. A Wildlife Resources Commission nursery was established and put into full-scale production. Only multiflora rose seedlings and sericea lespedeza seed were purchased.

During this year 4,271,550 bicolor lespedeza seedlings, 207 pounds of bicolor seed, 287,270 multiflora rose seedlings and 4,247 pounds of sericea lespedeza seed were distributed to 1,817 cooperators (Table I). This was an increase of approximately 1,200 percent in the amount of seedling materials distributed over the preceding year.

This expansion was, in part, the result of the cooperation received from other interested conservation agencies and groups such as the Agriculture Extension Service, Soil Conservation Service, Vocational Agriculture Departments, and various sportsmen's and wildlife clubs. A concerted effort was put forth to interest as many farmers and landowners as possible in establishing wildlife food and cover plantings on their farms.

Inspection of ten percent of the plantings indicated that 74 percent of the bicolor lespedeza plantings had a survival rating of 70 percent or above, 72 percent of the multiflora rose seedling plantings had a survival rating of 70 percent or above and 5 percent and 6 percent respectively of the cooperators who received these materials did not plant them—a planting with a survival rating of 70 percent or above was considered to be satisfactory from the wildlife standpoint (Tables II and III).

This decrease of about 20 percent in overall planting success was thought to be a result of expanding the program. Some materials went to cooperators who were not sufficiently interested in habitat restoration. They exercised less plant-

ing care and produced relatively poor plantings. Another factor which contributed to planting success was the method used in handling and distributing planting materials. Many times the seedlings received by the farmer were dried out and in very poor condition.

Another problem encountered was that of finding suitable wildlife food and cover planting materials that were adaptable to the various physiographic regions of North Carolina. It had been observed that bicolor lespedeza seedlings did not consistently produce seed in the short growing season of the Mountain Region. In order to solve this problem, several selections of shrub lespedezas were test planted for observational purposes at the Table Rock Fish Hatchery in the central Mountain Region of North Carolina. It was also observed that neither multiflora rose nor bicolor lespedeza were adapted to the deep sandy soils found in certain areas along the North Carolina coast.

1951. Interest in the Cooperative Farm Game Habitat Improvement program continued to increase in 1951. Although the total amount of materials distributed during this year was less than in the previous year, the number of cooperators who received free planting materials increased about 19 percent.

Inspection of ten percent of the plantings indicated that: Sixty-one percent of the bicolor plantings had a survival rating of 70 per cent or above, and 16 percent of the cooperators who received bicolor seedlings did not plant them; 83 percent of rose plantings had a survival rating of 70 percent or above; whereas only four percent of the cooperators who received rose seedlings did not plant them (Tables II and III). Summer drought was the reason given for reduced survival.

1952. The program was again expanded in 1952. About 22 percent more seedlings were distributed than during the preceding year and the number of cooperators increased 26 percent. An inspection of ten percent of the plantings revealed that 75 percent of the shrub lespedeza plantings and 67 percent of the rose plantings had a survival rating of 70 percent or above. Ten percent and seven percent, respectively, of the cooperators receiving these materials did not plant them (Tables II and III). The rate of survival was somewhat lower as a result of a change in the method of handling and transporting seedlings. Previously the majority of planting materials were mailed to cooperators, however, this system was uneconomical and prevented the biologist from making personal contact with the recipient of the materials. In 1951 and 1952 the majority of the materials were trucked to cooperators, thus allowing biologists to contact and encourage the cooperator to plant the materials in the recommended pattern and care for them until they became fully established.

An additional inspection was initiated this year for the purpose of determining the duration of planting usefulness to wildlife. The 1950 check sample was set up for reinspection each year to collect information on survival of plantings, growth, seed production, maintenance, competition from other species, and utilization.

1953. During the fourth year interest in the program continued to increase as farmers and sportsmen alike expressed their satisfaction with the results.

An inspection of plantings revealed that 62 percent of shrub lespedeza plantings had a survival rating of 70 percent or above, and 14.9 percent of the cooperators receiving these materials did not plant them; 78 percent of the rose plantings had a survival rating of 70 percent or above, and 13.2 percent of the cooperators who received these materials did not plant them (Tables II and III).

Biologists spent a considerable amount of time doing follow-up work subsequent to the distribution season to assure increased planting success. Emphasis was also placed on maintenance of old plantings during this period. Letters were forwarded to cooperating farmers of previous years informing them of the general need for maintenance and providing them with proposed maintenance techniques.

The problem associated with plant distribution methods was solved very satisfactorily during this period. Four-ply multiwall paper bags capable of holding 1,000 seedlings were used for packaging the seedlings for delivery to farmers. The tops of the bags were double folded and stapled, making each unit of seedlings almost airtight. This prevented rapid drying and assured the farmer that the plants were viable when he received them. The Commission trademark

on the bag served as an excellent advertising technique, and printed planting instructions helped assure proper plant care.

Efforts were continued to adjust the program to the varying needs in the various districts. Observations made as a result of the distribution of *Lespedeza japonica intermedia* in 1952 indicated that this variety too was unsatisfactory in the mountain counties of North Carolina. It matured early but did not hold its seed well and did not produce the quantity of seed desired. In the spring of 1953 the Soil Conservation Service distributed a variety of *Lespedeza japonica* known as Virginia 74 which proved to be more satisfactory.

It was noted during 1953 that the amounts of materials being distributed in the various wildlife districts reflected the need for wildlife food and cover plantings in those particular areas. Much of the rose and lespedeza seedling materials was being requested for the Piedmont area of North Carolina where livestock and dairy farming were making heavy inroads on farm game habitat.

1954. In 1954 the amount of materials distributed decreased somewhat as biologists and County Soil Conservationists stressed planting quality. Inspection of 1954 plantings revealed that 63 percent and 84 percent respectively of shrub lespedeza and multiflora rose plantings had a survival rating of 70 percent or above and 16.9 percent and 8.1 percent respectively of the cooperators who received these materials did not plant them (Tables II and III). From this it would appear that efforts toward quality plantings were not overly effective when attempted by our limited personnel.

It was observed during the past six-year period that as the number of farmer cooperators and amounts of materials distributed increased, planting success with few exceptions became generally poorer. Quality was being sacrificed for quantity. It became apparent that the number of personnel assigned to the farm game program did not have sufficient time to confer with the increased number of interested farmers who requested planting materials and technical information regarding farm game management. Also apparent was the fact that if the program was to be continued on a state-wide basis and the efficiency rating increased to a more desirable level, the amount of individual attention and follow-up work given to individual farmers must be increased.

During the spring of 1954 the Wildlife Resources Commission moved its nursery from the Sandhills Wildlife Management Area to Chapel Hill, North Carolina, to the site of a former Soil Conservation Service nursery. The better soil at this location made it possible to expand production to include all materials distributed by the Commission. The opportunities for plant observational work were also increased and this phase of activity was considerably expanded. Additional test areas were selected at four different locations in the state representing various soil type and climatic conditions. Approximately 110 species and varieties of potential wildlife food and cover plant species were tested in rod rows. Annuals as well as perennial materials were planted for observation and selections of various shrub lespedeza were chosen for future study.

During the spring of 1954, the Soil Conservation Service made available a limited quantity of a newly developed strain of shrub lespedeza known as Virginia 70 which exhibited many desirable traits. VA-70 died back to the ground each year, stoolled out from the crown in a very prolific manner, produced seed at a rate comparable to bicolor, and was readily adaptable to a wider variety of soils and climatic conditions. In addition to the establishment of a seed block for increase purposes, 390,000 VA-70 seedlings were purchased for distribution to cooperators in mountain counties.

1955. During the year of 1955 the amount of materials distributed as well as the number of cooperators who receive planting materials increased somewhat as more personnel were added to the project.

As a result of an evaluation study completed in 1954 (to be discussed in detail later) it was learned that the plantings established in conjunction with the farm game habitat improvement program were being utilized to a considerable degree by quail and rabbits and were, therefore, of proven value. Farmers, landowners, sportsmen, and the North Carolina Wildlife Resources Commission wanted to further expand the farm game program; however, they wanted some assurance that the materials distributed in an expanded program would be

planted and the current 60-70 percent of the plantings rated as successful be increased.

To attain improved planting success, eight farm game helpers were hired on an experimental basis to assist the district biologists. An effort was made to select individuals who were recognized leaders in their communities and counties and who were familiar with the program. Each was hired on a temporary basis to work part time during the distribution and planting season. It was thought that such an individual could visit the community leaders and promote farm game habitat improvement work on a community level, resulting in a concentration of plantings in one particular area which is more effective. His duties were to accept applications for planting materials, deliver materials and provide farmers with planting instructions, and do follow-up work to see that the materials were actually planted.

Although this phase of the program was initiated late in the 1955 planting season, enough was accomplished by the eight farm game helpers to indicate that this type of assistance could be used to advantage in many counties in North Carolina.

In 1955 the use of annuals for the purpose of providing a fall food supply for farm game was included in the farm game program. In previous years annual mixed seed had been distributed in a separate program, however, annuals had not been generally recommended because they were good for only one year. The use of annuals was increased in 1955, for it was realized that farm game management was much more effective where both annuals and perennials were used in a coordinated planting program.

1956. During 1956, the amount of farm game food and cover planting materials distributed was increased over the previous year by about 23 percent, and the number of farmer cooperators increased 31 percent (Table I). This was due in part to the hiring of 49 farm game helpers for part-time work during the distribution and planting season. They averaged working one month each and it was thought that these workers were a very worthwhile addition to the farm game program. The percent of people who did not plant their shrub lespedeza decreased from 18 percent in 1953 to 10.7 percent in 1956; and, the people who did not plant their rose seedlings decreased from 12.5 percent to 5.7 percent (Table II).

1957. In 1957 the farm program was further expanded. Eighty farm game helpers were hired to work in as many counties, contacting farmers regarding farm game habitat development work, delivering planting materials, doing follow-up work to assure a high percent of planting success and contacting cooperators who had established plantings during recent years to encourage maintenance.

The total amount of planting materials distributed was considerably greater than the previous year; however, the increase was made up of shrub lespedeza seed which was substituted for seedlings due to a shortage of plants.

The farm game program was modified to include the fencing of certain wildlife food and cover plantings which warranted protection. In certain sections of North Carolina the agricultural economy is geared to livestock production and dairying. All open land not enclosed by a fence is intensely grazed. Wildlife plantings although established with the best of intentions are very often destroyed by grazing. To overcome this difficulty the Wildlife Resources Commission agreed to furnish and erect fences around plantings which met certain specifications. In order to qualify for fencing, the landowner must be a member of a Community Farm Game Development Group, must sign an agreement to protect and maintain the planting, the planting to be fenced must be a minimum of 1/2-acre in size, planted in a recommended location and pattern, and have a satisfactory survival rating the first spring following establishment.

A further modification of the farm game program which occurred in 1957 was the overseeding of shrub lespedeza plantings with annual lespedeza such as Kobe or Korean. Normally shrub lespedeza plantings do not produce seed until the second year after establishment; however, it is desirable to have a food supply available the first year. Annual lespedeza provides a fall food supply each year and reseeds itself until shaded out by the shrubs.

A third modification of the program was the preparation of wildlife farm plans designed for intensive farm game management. The average farmer in North Carolina is neither interested nor wealthy enough to intensively manage his farm for game; however, several landowners, especially those who do not depend on their farm for a livelihood, have expressed a desire to accomplish intensive management. Over 50 management plans were drafted during the first few months this service was offered. Plans were based on accepted wildlife management practices with emphasis on habitat improvement plantings of annuals and perennials.

It is thought that continued emphasis should be placed on acquainting farmers and landowners with basic farm game management practices. There are many practices which could be adopted with little extra effort on the part of farmers if pointed out in a management plan. Among these are such items as strips of grain left in odd corners or adjacent to hedge rows; crops rotated to provide fallow fields; corn and other stubble left through the winter before being plowed under; mowing activities staggered to provide farm game with sufficient time to bring off a litter or brood; and the control of stray dogs and cats. These practices should be accomplished along with the establishment of supplementary plantings of annuals and perennials.

OBSERVATIONS AND STUDIES AFFECTING PRESENT FARM GAME MANAGEMENT RECOMMENDATIONS

A. ANALYSIS OF DATA PERTAINING TO THREE-, FOUR-, AND FIVE-YEAR-OLD WILDLIFE PLANTINGS

In 1952, an effort was started to secure information regarding the duration of usefulness of wildlife plantings. Plantings selected for study were chosen from the 1950 ten percent check list. Those chosen had a survival rate of 70 percent or above, were planted in a recommended pattern, and were well located from a wildlife standpoint. These plantings were reinspected in 1952, 1953, and 1954. Plantings were divided into three classes: Shrub lespedeza, multiflora rose, and combination plantings of shrub lespedeza planted adjacent to sericea lespedeza.

In the case of combination plantings, data on survival, growth, seed production, density of stand, and maintenance, apply only to the shrub lespedeza portion of the planting. Other data such as competition from other species, damage to plantings, number of plantings destroyed, and sign and species of wildlife utilizing the plantings apply to the entire planting.

The following observations were based on data gathered from an inspection of 113 shrub lespedeza plantings, 25 multiflora rose plantings, and 34 combination plantings of shrub and sericea lespedeza (Table IV).

SHRUB LESPEDEZA AND COMBINATION PLANTINGS

1. The density of stand of shrub lespedeza plantings increased as the planting became older, at least through the fifth year. This applied particularly to unmaintained plantings.

2. Competition from various pine and hardwood species occurred in about 50 percent of shrub lespedeza plantings.

3. Growth and seed production were termed as good in over 60 percent of the shrub lespedeza borders inspected. These were 3, 4, and 5 years old.

4. Maintenance practices were applied to six percent of shrub lespedeza plantings and 18 percent of the combination plantings during their fourth year of growth.

5. The rate of damage and destruction of shrub lespedeza plantings was three times as great when planted alone as when planted in combination with sericea. The rate of destruction of shrub lespedeza plantings alone was about 10 percent per year, whereas the rate of destruction of combination plantings was about three percent per year. It was apparent that sericea strips were acting as buffers for the shrub lespedeza plantings.

6. Grazing and plowing were the two most important agents of destruction of plantings.

7. In 1953, 38 percent of the combination plantings as compared with 18 percent of the shrub lespedeza plantings alone contained evidence of utilization by

quail. In 1954, 53 percent of the combination plantings as compared with 17 percent of the shrub plantings alone contained evidence of utilization by quail.

8. In 1953, 24 percent of the combination plantings as compared with 10 percent of the shrub lespedeza plantings alone contained evidence of utilization by rabbits. In 1954, 17 percent of the combination plantings as compared with 11 percent of the shrub plantings alone contained evidence of utilization by rabbits.

MULTIFLORA ROSE PLANTINGS

1. The growth made by multiflora rose hedges in 1952, 1953, and 1954 was termed good in 30 percent, 66 percent, and 62 percent, respectively, of the fences examined and fair to poor in the remainder.

2. Forty-four percent of the fences were undergoing competition from other species such as hardwood, pine, honeysuckle, and weeds in that order of importance.

3. Fifty-five percent of the rose fences inspected were fertilized in 1953, 25 percent in 1954.

4. Rose fences are destroyed at an average rate of five percent per year; however, the actual rate of destruction decreases considerably as the plantings become older and better established.

5. Seventy-eight percent of the rose plantings inspected during 1953 were judged capable of developing into a livestock proof fence. Poor initial survival, severe competition from weeds and grass the first year and grazing were found to be the major reasons that rose plantings did not make fences and travel lanes for wildlife.

In 1953, 17 percent of the rose fences inspected contained evidence of utilization by quail, 34 percent by rabbits. In 1954, 25 percent of all rose fences contained evidence of utilization by quail, 1 percent by rabbits.

B. SEED PRODUCTION OF SHRUB LESPEDEZA PLANTINGS

The standard recommendation for perennal food patches was $\frac{1}{8}$ -acre of shrub lespedeza. This recommendation was based on the theory that shrub lespedeza produced seed at the rate of about 500 pounds per acre; the $\frac{1}{8}$ -acre would provide about 60 pounds of seed which is thought to be sufficient for its intended purpose. It became apparent after several years of observation that the average planting in North Carolina was not producing at this rate.

In the early fall of 1955, twenty-eight shrub lespedeza plantings were chosen for the purpose of determining seed production. The plantings selected represent ~~to be average or above in seed production~~ ~~the regions of North Carolina~~ and were thought to be average or above in seed production. Two seed traps, two feet in size, were placed in each planting to catch the natural seed fall. The average yield of the 28 plantings was 265.8 pounds per acre or 33.2 pounds of seed per $\frac{1}{8}$ -acre planting. Four plantings which had been maintained by cutting back and fertilizing produced an average of 430 pounds of seed per acre, with one of the four producing at the rate of 630 pounds per acre. Three plantings which had been ~~not fertilized~~ or fertilized were found to be producing seed at a rate of 215 pounds per acre.

Seed production of 28 plantings was again determined in 1956. The average yield was 204 pounds per acre or 25.5 pounds of seed per $\frac{1}{8}$ -acre planting.

It is thought that a minimum of 60 pounds of shrub lespedeza seed should be produced at each location where a planting is expected to be of value to a covey of quail. Since the 1955 seed collections indicated that $\frac{1}{8}$ -acre plantings were of sufficient size to produce the desired amount of seed only if they were properly maintained, and since the majority of landowners do not maintain their plantings, it has been found necessary to recommend that the size of shrub lespedeza plantings be increased from $\frac{1}{8}$ - to $\frac{1}{4}$ -acre.

C. UTILIZATION STUDY OF WILDLIFE FOOD AND COVER PLANTINGS

During the early years of the project it was recognized that there was a need for utilization data to substantiate the theory that habitat plantings established as a result of the Commission's farm game program were being utilized by quail and rabbits. The purpose of the study was not to determine the number of rabbits and quail using the planting but instead to determine if these species were utilizing the plantings. Selected plantings were carefully searched at

monthly intervals for signs of quail and rabbits. The plantings studied were located on five farms, three in the Piedmont region and two in the Mountains. Not all of the plantings were visited each month; consequently, the number of plantings examined varied over the 24-month period.

An analysis of planting utilization data indicated that shrub lespedeza and multiflora rose plantings received a great deal of utilization by quail and rabbits (Table V). It was noted that rabbit sign was observed every month in about 50 percent of all shrub lespedeza plantings during the course of two years of study, June 1954 to June 1956. Quail sign in shrub lespedeza plantings was also observed every month during the two-year period, however, to a lesser degree. Rabbit sign was noted in over 50 percent of all rose fences nearly every month throughout the two years of monthly observations. Quail sign in multiflora rose plantings was observed only occasionally (Table V).

STATUS OF CURRENT PROGRAM

Observations and studies previously discussed have led to changes which are considered to have been of significance in improving the farm game program.

1. A comprehensive plant observation and selection program conducted with the help of the Soil Conservation Service resulted in the use of a wider variety of more desirable strains of plants which were better adapted to soil and climatic conditions. This activity is considered to be of major importance and is being continued at the present time and includes the testing of both perennials and annuals.
2. It was found that the hiring of farm game helpers to assist project personnel in promoting farm game management on the community and county level was very beneficial. Many more cooperators were reached, the amount of planting materials distributed was increased, and planting success was improved as a result of additional individual attention given to cooperators.
3. The integration of annuals and perennials into a comprehensive management program provided additional benefits. Cooperating farmers could see the results of habitat restoration much more readily when annuals were used in conjunction with perennials. Annual plantings tend to concentrate the birds in the fall during the hunting season but apparently do not greatly affect winter carry over without the aid of perennials.
4. A food supply the first year a planting is established is desirable and, since most shrub lespedeza plantings do not produce seed until the second year, the practice of overseeding these plantings with annual lespedeza has been adopted.
5. On the basis of seed production studies of established plantings the recommended size of shrub lespedeza plantings has been increased from $\frac{1}{8}$ to $\frac{1}{4}$ acre. It was found that average $\frac{1}{8}$ -acre plantings were not sufficiently maintained to produce the desired amount of food.
6. Since the success of farm game management is in direct proportion to the interest of the landowner, the program was broadened to include not only state-wide development work on a large number of farms, but also intensive farm planning for a minority of landowners who showed enough interest to justify this degree of individual attention.
7. Experience has shown that there is a need for protecting plantings from livestock in areas of the state which are intensively grazed. Fencing is furnished to landowners whose plantings meet certain specifications. In order to qualify for free fencing, the landowner must be a member of a Community Farm Game Development Group and must sign an agreement to protect and maintain the planting.
8. It is recognized that there is a continuing need for evaluation studies to insure that the farm game management program continues to serve its intended purpose.

PRESENT CONCEPT OF FARM GAME MANAGEMENT IN NORTH CAROLINA

The need for farm game management in North Carolina is as great now as it was in 1948. Agricultural trends have not changed, but have become more intensified. Clean farming methods and the control of insects and weeds in crop

fields prevails as a standard farming practice. The diminution of farm game populations is certain to continue on a state-wide basis unless present trends are modified. It is the objective of the farm game program to retard the present downward trend by accomplishing state-wide habitat restoration.

Suitable habitat is essential to the survival of wildlife. It follows, therefore, that the first step in any farm game management program is the development of suitable habitat. It is impossible to return to the agricultural methods used many years ago when rail fences were commonplace and farm game was plentiful. Hence, it is necessary to develop methods of farm game management that are compatible with the average present-day farming operation such as crop rotation, strip farming, fallowing, and leaving strips of seed-producing crops unharvested along field edges. After these basic farm game management practices have been accomplished, the establishment of supplementary food and cover plantings should follow. Plants used in establishing these plantings should consist of shrub and sericea lespedezas, multiflora rose, and various annuals.

Review of data indicates the program followed is basically sound and effective. It has been observed on many farms and in many sections that habitat restoration has meant the difference between the presence of absence of game. Land-owners and sportsmen appear to be satisfied with this approach.

TABLE I
FARM GAME PLANTING MATERIAL DISTRIBUTION RECORDS, 1949-57

Year	No. of Coop.	<i>Bicolor Lespedeza</i> Seedlings	<i>L. Japonica Intermedia</i> Seedlings	<i>VA-74 Lespedeza</i> Seedlings	<i>VA-70 Lespedeza</i> Seedlings	<i>Multiflora Rose</i> Seedlings	<i>Bicolor Lespedeza</i> Seed	<i>VA-70 Seed</i>	<i>Sericea Lespedeza</i> Seed
1949	434,550	.....	.....	.....	54,145	.....	.....	220 lbs.
1950	4,271,550	.....	.....	.....	287,270	207 lbs.	.....	4,247 lbs.
1951	3,840,200	.....	.....	.....	423,600	.....	.....	4,669 lbs.
1952	4,809,525	85,000	.....	.....	596,276	63 lbs.	.....	5,699 lbs.
1953	4,902,400	.....	184,000	.....	2,139,253	.....	.....	8,505 lbs.
1954	3,184,800	1,000	23,000	390,750	1,725,635	776 lbs.	.....	8,168 lbs.
1955	3,907,350	.....	.....	320,125	1,506,109	1,303 lbs.	.....	9,591 lbs.
1956	5,281,800	.....	.....	928,975	1,262,005	1,527 lbs.	327 lbs.	15,289 lbs.
1957	2,331,800	.....	.....	2,640,000	2,193,425	8,528 lbs.	70 lbs.	17,994 lbs.
Total		32,963,975	86,000	207,000	4,279,850	10,187,718	12,404 lbs.	397 lbs.	74,382 lbs.

TABLE II
 PERCENT OF INDIVIDUALS WHO FAILED TO PLANT FOOD AND COVER MATERIALS,
 1950-56
 (Based on Inspection of Plantings Established by 10 Percent
 Random Sample of Cooperators)

Year	Percent of Cooperators		Who Did Not Plant	
	Shrub <i>Lespedeza</i> Seedlings	<i>Multiflora</i> <i>Rose</i> Seedlings	Shrub <i>Lespedeza</i> Seed	<i>Sericca</i> Seed
1950	4	6	...	...
1951	13	4	...	...
1952	10	7	...	...
1953	14.9	13.2	...	33.3
1954	16.9	8.1	...	28.6
1955	18.1	12.5	28.6	40.6
1956	10.7	5.7	35.7	26.6

TABLE III
 PERCENT OF ESTABLISHED PLANTINGS WITH SURVIVAL RATING OF 70% OR ABOVE
 (Based on Inspection of Plantings Established by 10 Percent
 Random Sample of Cooperators)

Year	Shrub <i>Lespedeza</i>	<i>Multiflora</i> <i>Rose</i>
1950	74	72
1951	61	83
1952	75	67
1953	62	78
1954	63	84
1955	58	76
1956	76	73

TABLE IV
 FARM GAME PLANTING DATA
 (Plantings Established in 1950, Inspected in Summer of 1952, 1953, and 1954)

34 COMBINATION PLANTINGS OF SHRUB AND SERICEA LESPEDEZA			
Density of Stand	% Dense	% Medium	% Thin
1952	50	41	9
53	48	42	9
54	64	32	4
Growth	% Good	% Fair	% Poor
1952	68	26	6
53	66	21	9
54	75	21	4
Seed Production	% Good	% Fair	% Poor
1952	—	—	—
53	69	24	6
54	75	21	4
Invasion by Other Plant Species	% Yes	% No	
1952	—	—	—
53	36	63	—
54	32	68	—
Invading Species	% Pine	% Hardwood	% Honeysuckle
1952	—	—	—
53	33	33	17
54	22	66	22

TABLE IV—Continued

FARM GAME PLANTING DATA

(Plantings Established in 1950, Inspected in Summer of 1952, 1953, and 1954)

34 COMBINATION PLANTINGS OF SHRUB AND SERICEA LESPEDEZA

<i>Maintenance Applied</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	18	82	—
54	4	96	—
<i>Plantings Damaged</i>	<i>% Yes</i>	<i>% No</i>	
1952	32	68	—
53	10	90	—
54	18	82	—
<i>Type of Damage</i>	<i>% Burning</i>	<i>% Grazing</i>	<i>% Agricultural</i>
1952	18	45	36
53	—	66	33
54	—	—	100
<i>Plantings Destroyed</i>	<i>% Yes</i>	<i>% No</i>	
1952	3	97	—
53	3	97	—
54	3	97	—
<i>Signs of Wildlife Utilization</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	48	52	—
54	79	21	—
<i>Species of Wildlife Utilizing Planting</i>	<i>% Quail</i>	<i>% Rabbit</i>	
1952	—	—	—
53	75	50	—
54	68	32	—

113 PLANTINGS OF SHRUB LESPEDEZA ALONE

<i>Density of Stand</i>	<i>% Dense</i>	<i>% Medium</i>	<i>% Thin</i>
1952	32	47	18
53	37	39	24
54	42	39	19
<i>Growth</i>	<i>% Good</i>	<i>% Fair</i>	<i>% Poor</i>
1952	63	29	7
53	61	28	11
54	52	39	9
<i>Seed Production</i>	<i>% Good</i>	<i>% Fair</i>	<i>% Poor</i>
1952	—	—	—
53	60	36	4
54	55	38	6
<i>Invasion by Other Plant Species</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	55	45	—
54	66	34	—
<i>Invading Species</i>	<i>% Pine</i>	<i>% Hardwood</i>	<i>% Honeysuckle</i>
1952	—	—	—
53	13	34	7
54	22	54	7
<i>Maintenance Applied</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	6	94	—
54	20	20	—

TABLE IV—Continued

FARM GAME PLANTING DATA

(Plantings Established in 1950, Inspected in Summer of 1952, 1953, and 1954)

113 PLANTINGS OF SHRUB LESPEDEZA ALONE

<i>Plantings Damaged</i>	<i>% Yes</i>	<i>% No</i>	
1952	13	87	—
53	33	67	—
54	19	81	—
<i>Type of Damage</i>	<i>% Burning</i>	<i>% Grazing</i>	<i>% Agricultural</i>
1952	4	30	66
53	3	27	65
54	—	7	93
<i>Plantings Destroyed</i>	<i>% Yes</i>	<i>% No</i>	
1952	10	90	—
53	10	10	—
54	10	90	—
<i>Signs of Wildlife Utilization</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	28	72	—
54	29	71	—
<i>Species of Wildlife Utilizing Planting</i>	<i>% Quail</i>	<i>% Rabbit</i>	
1952	—	—	—
53	66	34	—
54	45	36	—

25 MULTIFLORA ROSE PLANTINGS

<i>Growth</i>	<i>% Good</i>	<i>% Fair</i>	<i>% Poor</i>
1952	30	52	17
53	66	22	11
54	62	37	—
<i>Invasion by Other Plant Species</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	44	56	—
54	44	56	—
<i>Invading Species</i>	<i>% Hardwood</i>	<i>% Pine</i>	<i>% Honeysuckle</i>
1952	—	—	—
53	50	14	12
54	57	14	—
<i>Plantings Destroyed</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	16	84	—
54	6	94	—
<i>Maintenance Applied</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	55	45	—
54	25	75	—
<i>Plantings Damaged</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	34	66	—
54	38	62	—
<i>Type of Damage</i>	<i>% Burning</i>	<i>% Grazing</i>	<i>% Agricultural</i>
1952	—	—	—
53	30	51	19
54	—	50	50

TABLE IV—Continued

FARM GAME PLANTING DATA			
(Plantings Established in 1950, Inspected in Summer of 1952, 1953, and 1954)			
25 MULTIFLORA ROSE PLANTINGS			
<i>Will Plantings Make Fence?</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	78	22	—
54	69	31	—
<i>Signs of Wildlife Utilization</i>	<i>% Yes</i>	<i>% No</i>	
1952	—	—	—
53	56	44	—
54	50	50	—
<i>Species of Wildlife Utilizing Planting</i>	<i>% Quail</i>	<i>% Rabbit</i>	
1952	—	—	—
53	30	60	—
54	50	37	—

TABLE V

FARM GAME PLANTING—UTILIZATION DATA

SHRUB LESPEDEZA

<i>Month</i>	<i>No. of Plantings Checked</i>	<i>% of Plantings in Which Wildlife Observed</i>		<i>% of Plantings in Which Wildlife Sign Observed</i>	
		<i>Rabbit</i>	<i>Quail</i>	<i>Rabbit</i>	<i>Quail</i>
June, '54	19	5.3	26.3	47.4	36.8
July	11	9.1	0	54.5	27.3
August	19	5.3	5.3	36.8	26.3
September	15	20.0	6.7	46.7	13.3
October	19	5.3	10.5	68.4	31.6
November	11	0	9.1	45.4	45.4
December	19	0	5.3	68.4	15.8
January, '55	11	0	18.2	36.4	9.1
February	7	14.3	0	100	28.6
March	18	0	0	55.5	33.3
April	14	7.1	0	35.7	14.3
May	19	26.3	5.3	26.3	10.5
June	10	10	0	20	20
July	13	15.4	7.7	15.4	15.4
August	11	0	0	9.1	9.1
September	10	0	10.0	30	30
October	7	0	0	42.8	28.6
November	7	0	14.3	57.1	57.1
December	18	5.6	5.6	38.9	27.8
January, '56	13	0	0	53.8	7.7
February	6	0	0	33.3	50
March	11	9.1	9.1	27.3	9.1
April	10	10	10	40	50
May	7	0	0	57.1	14.3

TABLE V—Continued
 FARM GAME PLANTING—UTILIZATION DATA

Month	No. of Plantings Checked	MULTIFLORA ROSE		% of Plantings in Which Wildlife Observed	
		% of Plantings in Which Wildlife Observed		% of Plantings in Which Wildlife Observed	
		Rabbit	Quail	Rabbit	Quail
June, '54	4	1	—	100	25
July	3	—	—	66	—
August	4	1	50	50	50
September	4	—	—	50	—
October	4	—	—	50	—
November	3	—	—	50	—
December	4	—	—	75	50
January, '55	3	—	—	33	—
February	3	—	—	66	—
March	2	—	—	100	—
April	2	—	—	100	—
May	4	—	25	50	—
June	1	—	—	100	—
July	3	—	—	100	33
August	2	—	—	50	—
September	1	—	100	—	100
October	2	—	—	50	50
November	2	—	—	50	—
December	2	—	—	100	50
January, '56	3	—	—	66	—
February	—	—	—	—	—
March	2	—	—	100	—
April	1	—	—	100	—
May	2	—	—	50	—

SHOOTING PRESERVES IN THE SOUTH

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The following are personal observations on shooting preserves after working with them in varying degrees in nearly 20 states the past four years.

Thirty-eight states now allow shooting preserves to operate during extended seasons for one or more species. While most states have legislative authority, some states allow preserves to open for non-native game because of a lack of prohibitory laws.

The first enabling legislation for the establishment of shooting preserves was entered in New York in 1910. There is sufficient experience with basic legislation and regulations so that any state may enact laws which are fair to the operators of shooting preserves, the state game commissions which must administer these laws, and the general sportsman.

Two basic essentials of model shooting preserve legislation which should be included are a minimum and maximum acreage for a single preserve. In much of the South, where leasing rights are cheap, a maximum acreage is imperative. Shooting preserve operators tend to tie up more land than they need. A maximum acreage of 1,000 acres is ideal; it has been proven in many states to be a happy medium. One thousand acres are all that are needed for handling quail, pheasants, chukars and mallards, the game most commonly released.

A minimum acreage of 100 is needed so that a new operator will have to go to a certain amount of trouble in getting a license, posting land and generally