

THE RELATIVE VALUE OF THE ROTATION OF CROPS AND ARRANGEMENT  
OF FIELDS TO PHEASANT MANAGEMENT IN SOUTHERN MICHIGAN

by

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of the requirements for the degree of  
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## INTRODUCTION

Since the southern part of Michigan is intensely farmed, a problem of crop rotation and field arrangement in relation to pheasant management is one of extreme importance. Swears, 1941, states that 55% of the farmers and farmers' sons are hunting enthusiasts, so the results and findings of this problem should be welcomed by them. It is through the lack of knowledge that the farmer today does not have more game to kill. By bettering the cover and food conditions for this great game bird, the pheasant, the population of the bird should be increased. Through the study of the present crop rotations and field arrangements, it is possible to see the errors made and make suggestions for improvements, in correlation with farm practices, without cash expense to the farmer.

The field operations of this problem were started by fall of 1940, and continued on into May of 1941. The problem has been under the constant guidance of Professor H. M. Wight; while Professor S. A. Graham has also been a guiding influence in the progress of this work. Professor E. C. O'Roke has also offered his suggestions in carrying on the work. The farmers of Washtenaw County have been extremely

helpful to the author, which have helped to make this work possible. The author is grateful to Miss Muriel Brendenuhl for her work in the coloring of the maps. The author has had the aid and use of Professor Wight's and Professor Graham's bird dogs in doing the bird census.

### Agricultural Value of Southern Michigan

Southern Michigan represents an enormous industry in the value and produce of her farms. Hill, 1939, has divided Michigan into seventeen farm types, based upon their source of income. Of these, six are typical of Southern Michigan. They are: 1) corn and livestock, 2) small grains and livestock, 3) southwestern fruit and truck crops, 4) poultry, dairy and truck crops, 5) dairy and general farming, 6) dairy and cash crops.

The twenty southern counties comprise some 7,900,000 acres of land, of which 80.4% is in farms. Washtenaw County, also has 80.4% of its land in farms. Pettet, 1941, states that an average of 47.1% of its land in farms in the twenty counties, was considered cropland and harvested in 1940. Washtenaw County cropped and harvested 47.5% of its farm land in 1940. The average size was 92.8 acres, while the average size farm for Washtenaw County was 109.6 acres. The average percent of tenancy for the twenty counties was 20.4% in 1940, while in Washtenaw it was 19%.

The following crops are grown in Michigan: corn, oats, timothy, clover, alfalfa, wheat, beans, fruit, potatoes, barley, sugar beets, rye, clover seed, alfalfa seed, truck crops, and peppermint.

Below are given the major crops of Michigan, for a ten year period with their values as given by Hill, 1939, page 38.

Crop	Acreage	Percent of Tillable Land	Total Annual Value	
			Total in Thousands	Per Acre
Hay	2,579,600	22	\$29,037	\$11.26
Corn	1,468,000	13	28,420	19.36
Oats	1,351,900	11	13,962	10.33
Wheat	821,500	7	13,379	16.29
Beans	566,100	5	12,857	22.71
Fruit, apples, cherries, peaches, pears, plums, grapes	326,600	3	13,399	41.03
Potatoes	279,600	2	14,481	51.79
Barley	226,100	2	2,905	12.85
Sugar Beets	93,600	1	4,662	49.81
Rye	159,200	1	1,225	7.07
Alfalfa seed	30,878	--	435	14.08
Truck crops	110,640	1	10,786	97.48
Peppermint	13,626	--	776	56.95

The hay acreage is so high because the upper peninsula has 50% more hayland than the average for the entire state of Michigan. Southern Michigan ranges from 44% and down for their average in haylands. Seventy-five percent of the corn, oats, barley, wheat acreages are found in Southern Michigan. Potatoes and fruit are quite generally scattered throughout the state, with a predominance for fruit growing along the western shores of Michigan. (Michigan Agricultural Census of 1940, 1941)

Hill, 1939, page 29, has recorded the average crop yields for Michigan by type of farming areas as follows:

Average Crop Yields										
Area	Alfalfa	Grain	Silage	Oats	Barley	Wheat	Rye	Beans	Pota-	Sugar
	Tons	Bu.	Tons	Bu.	Bu.	Bu.	Bu.	Bu.	toes	beets
1	1.76	33.4	7.7	32.2	22.7	21.0	13.3	8.8	87	8.2
2	1.61	26.0	5.9	25.1	18.3	17.9	11.7	7.7	85	---
3	1.80	23.0	6.3	24.4	17.3	17.8	11.8	8.4	81	---
4	1.96	25.1	7.3	28.4	19.8	20.1	10.9	9.3	86	6.3
5	1.66	33.1	6.7	32.3	21.7	20.5	13.4	10.2	91	7.1
6	1.50	32.6	7.8	30.7	21.7	18.8	12.9	10.1	95	7.3

Through the previous discussion one can readily see that Southern Michigan ranks well as an agricultural state.

#### Crop Rotation and Its Values

Rotation of crops soon established itself in the United States along with its wave of immigration. It is practised in varying degrees throughout the United States according to its definition. Hudelson, 1939, p. 50, defines crop rotation as a definite succession of crops following one another in a specific order; the succession is usually repeated at the end of from three to seven years. Some farmers may not follow a systematic succession of crops, but they keep changing crops grown in one field.

There are nine reasons for a crop rotation, as given by Hutcheson, Wolfe and Kipps, 1936, p. 176. They are as follows:

"1) control of weeds, insects and diseases; 2) maintenance of organic matter; 3) nitrogen supply; 4) economy of labor; 5) protection of the soil; 6) alternation of crops; 7) regulates the use of plant nutrients from the soil; 8) systematizes farming; and 9) increases crop yields."

A crop rotation to be essentially a good one should include the following points as given by Hutcheson, Wolfe, and Kipps, 1936, p. 179.

"1) The area of each crop should be nearly the same year after year unless there is a definite reason for changing it; 2) The rotation should provide roughage and pasture for the animals kept; 3) The rotation should include one tilled crop for the elimination of weeds; 4) It is desirable that a rotation include a sod; 5) The rotation and feeding system should provide for keeping up the organic matter of the soil; 6) The rotation should provide as large an area of the most profitable cash crop or crops as can be cared for."

Rotations usually are from three years to seven years, while some two year rotations are in effect in some states. The shorter rotations are usually in effect on level heavy soils, where fertility is very high and carries a small amount of sheet erosions.

Some four and five year rotations as given by Minneman and Hill, 1934, Michigan State College, A. E. S. Bull. 254, are as follows:

For Dairy Farms

1st yr.	2nd yr.	3rd yr.	4th yr.	5th yr.
Corn	Oats	Wheat	Mixed hay	Pasture
Corn	Oats & Barley	Wheat & pasture	Alfalfa	
Silage Corn	Wheat, Oats, & Barley	Special cash crop	Alfalfa	

For Livestock-fattening and Special Crop Farms

<u>1st yr.</u>	<u>2nd yr.</u>	<u>3rd yr.</u>	<u>4th yr.</u>	<u>5th yr.</u>
Corn	Wheat, oats & barley	Hay		
Corn	Oats or barley	Wheat		
Corn	Corn	Oats or barley	Hay	
Corn	Corn	Oats or barley	Wheat	Hay
Corn	Oats (seeded to S.Cl.)	Corn	Barley	Hay

In the case where alfalfa is the hay crop, it is usually left from three to four years; while other hay is left from one to two years.

Since the pheasant is a bird of the agricultural lands, the crops in turn must furnish in part the cover and food for its life equation. Food and cover affect the pheasant population, and through proper management of these factors large populations are possible.

Wight, 1933, has listed eight simple practices to meet the chief requirements of the pheasant, and they are as follows:

1. Providing adequate cover during each month of the year.
2. Arranging the cover to meet the largest possible number of requirements.
3. Providing nourishment by the protection of natural food, and by supplying permanent artificial feeding grounds, including food strips and food patches.
4. Providing rearing grounds where pheasants may rest in safety, rear their young unmolested, and at all times find suitable shelter from their predatory enemies.

5. Supplying lines of communication which make a greater cruising radius safely possible, and at the same time increase the shooting area.
6. Increase the number of crowing areas in order that maximum population may develop.
7. Providing the correct balance between game birds, predators, farm stock, rodents, insects, and song birds, so as to protect the interest of the landowner as well as the sportsmen.
8. Provide a means of controlling the three major movements of pheasants which occur each year.

The pheasant's diet is varied. Dalke, 1933, p. 19, states that the pheasant is quite omnivorous and feeds on almost any plant or small animal. He has recorded one hundred and six plant species and forty-two families eaten by the pheasant in Southern Michigan. Four of the main families represented in the pheasant diet are the Gramineae, with nineteen species, the Rosaceae with ten species, the Leguminosae with seven species and the Compositae with six species.

According to Dalke, 1934, pp. 23 and 24, cultivated grains ranked first in the pheasant's diet, range from 36% to 95% of the total diet by months. The lowest month was January having a total of 36%, followed close by November with a total of 41%. The average for the entire year for cultivated grains was 74% of its entire diet. Wild seeds rated second with an average by months of 12.3% of its total diet.



Dalke, 1934, p. 21, Table V, has further broken down the pheasant's diet of cultivated grains as follows:

Species	% of year's diet	% of Total Grains Eaten
Corn	33	45
Wheat	20	27
Barley	8	11
Beans	5	7
Oats	5	6
Buckwheat	3	4
Total	74%	100%

Ragweed composed 6.3% of the wild seeds taken by the pheasant. It is especially abundant in stubble fields.

Cover plays its important role in form of protection. Good cover provides protection from enemies and places for nesting. The physiological condition of the pheasant is disturbed under poor cover. The bird is not at ease and body functions and processes are not normal. This, in turn, may effect health and vigor of the bird or even cause conditions not suitable to nesting.

Cover at different periods of the year is extremely important, while still more important is dispersal and the nearness to food. Cover may be good for year round roasting, but if food is not adjacent, the type is not extensively used.

The marsh type plays an important part in pheasant cover in Southern Michigan. Wight, 1930, in his pheasant management studies of Michigan, has shown the marsh type to be the type

most frequently and constantly used. One and five-tenths percent of the pheasants observed in July was in the marsh cover, while 64% of the birds observed in February were in the marsh cover, p. 222. During the months of November, December, January, February, March, and April the marsh cover carried an average of 47% of the pheasants. While 47% of the birds were observed in this type, probably 99 to 100% of the birds roosted in this type.

Grass and herbaceous plant cover is used quite evenly throughout the year. With the exception of February, when no birds were observed in this cover, 19.9% of the birds observed for the year were in this cover. The type is used quite extensively for early nesting.

Hayfields were extremely important during the spring and summer months. During the months of June and July, 36.7% and 40.7% of the birds respectively were recorded in this cover type. Nesting is at its height, then and this indicates its importance in the life role of the pheasant. The average percentage of birds recorded in hayfields for April, May, June, July, and August was 27%.

Birds were recorded in corn fields for every month except May, this is probably due to the fact that the month of May is the planting time for corn in Southern Michigan. The percentage ranges high from September on through to March except November, which is the harvesting season for corn in

Southern Michigan. For the months of September, October, November, December, January, and February the percentages were as follows, respectfully: 36.7, 30.0, 2.4, 22.6, 11.1, and 17. For March and April the percents were as follows: 6.3 and 11.1.

Pheasants were only recorded in grainfields during the month of June, July, August, and September. This is mainly due to the fact that wheat, oats, barley, and rye do not obtain a growth sufficient to conceal birds properly before June. Fourteen and one-tenth percent of the birds observed in July were in grain fields and 16% observed in August were in grainfields. This was mainly due to large amounts of waste grain left lying in the fields that the birds feed on.

The above figures present types where birds were found, but can only be used to indicate the relative importance to the pheasant, and becomes of value in this problem when used to tie into the life history of the bird as the author has attempted.

In summation, the marsh type is the pivot type; used entirely for protective cover and the hayfields, cornfields, and grainfields mainly serve their purpose in connection with nesting and feeding.

### Field Arrangement and Its Values

In the consideration of arrangement of fields the first consideration must be that of the kind and amount of livestock on the farm. In case of a dairy farm more pasture is needed; or in case of grain farming pastures can be eliminated.

After the kind and amount of livestock has been considered the crop rotation will be decided. This, in turn, will bear upon the soil type and topography.

Hudelson, 1939, gives six good points to follow in planning the field layout on a farm, and are as follows:

1. The number of crop fields should be the same as the number of years required for one round of the rotation, though if physical conditions make this possible two small fields or several strips across the slope may be kept in the same crop and treated as one field.

2. Field operations are more economically performed in fields that are relatively long in comparison to their width.

3. Large fields promote efficiency in the use of labor, power, and equipment.

4. The crop fields should be as nearly uniform in size as possible, so that the acreage of each crop may be about the same each year. This promotes uniformity in the feed supply and in the seasonal requirements for labor, power, and equipment.

5. The fields should be as convenient to the farmstead as possible, to avoid lost time in going to and from field work and to make it convenient to move livestock back and forth when the fields are pastured.

6. Fields are more efficiently handled if they do not contain radically different soils or slopes.

Fields that are handled as rectangles, when possible, usually reach the farmstead and also the back end of the farm.

Farms that are not level and contain erosion should be handled on the contour plowing basis, so as to eliminate as much erosion as possible.

The field arrangement on some farms are very good, while others are the extreme opposite. The arrangement may not be good in some cases, but due to good brushy fence rows, travel lanes are created, and the resultant of fair game populations occur. All natural features on the farms, such as marshes, kettle-holes, swamps, woods, weeds, and brush patches should be utilized as axis covers for wildlife in field arrangement. Where these occur all the fields should be run into or connected so that all cropped areas can be used by wildlife. If all the fields cannot be run up to the margin of a good marsh, then good travel lands should be created or encouraged.

### Statement of the Problem

Through recent studies of the pheasant, it is known that this bird thrives well on areas producing fair acreages of corn. It thrives extremely well throughout the corn belt of the middle west of the United States; and also quite well throughout the farming areas of Pennsylvania, northern and central Ohio, and the southern part of Michigan where more diverse farming exists. No actual work has been done previously to find the effects of crop rotations and field arrangement on the pheasant. With the farmland of Washtenaw County being representative of southern Michigan, it is the author's objective to find the values of rotations upon the pheasant population.

### Crop Rotation in Southern Michigan (Washtenaw County)

#### Method of Study

##### 1. Areas Studied

Twelve sections of land, located in five different townships of Washtenaw County are selected. They were considered to give an average picture of agricultural and pheasant relationships. Two of these sections are isolated sections, four are in two two-section areas, and the remaining six sections are joined, thus giving three different sized areas ranging from six hundred and forty acres to thirty-nine hundred and thirty-three acres. A total acreage of seventy-nine hundred

acres has been studied in five isolated areas to find the effects of crop rotations upon the pheasant population. Map on page 15 will show location of areas studied in relation to the county at large.

## 2. Procedure of data collection.

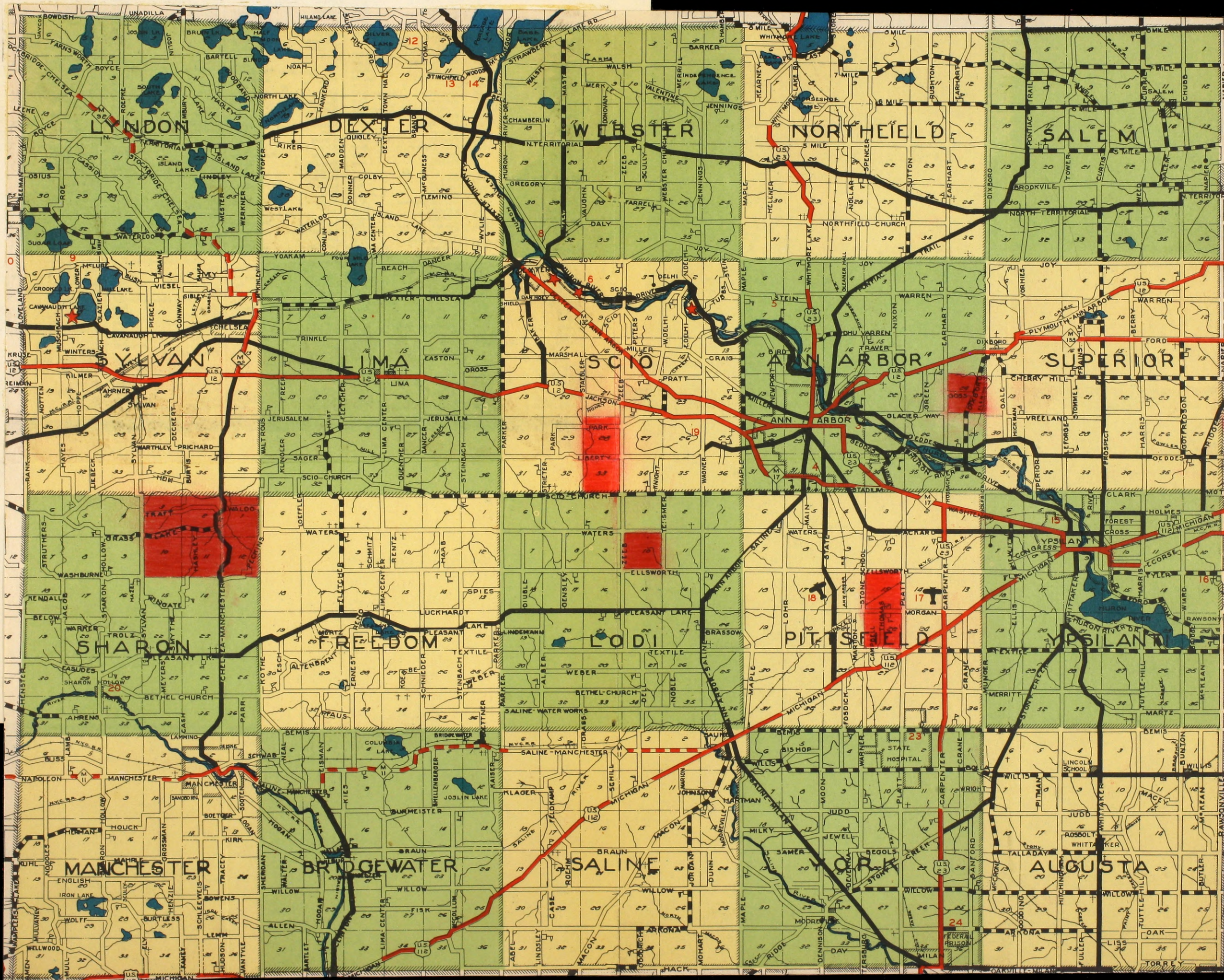
Base maps, made by students of the Wildlife Management Course, were secured from the map department of the School of Forestry and Conservation of the University of Michigan. They were in the form of cover maps, based upon Professor H. M. Wight's classification of cover types. These maps were then enlarged from three to six inches to the mile, a tracing made from them, leaving off all cover symbols, and base maps made from these. Five maps were used for each section, indicating one map for each year, or securing the crops for 1937, 1938, 1939, 1940, and 1941. The 1940 crop, and part of the 1941 crop was secured while the author checked the base map while actually working on the area. The remaining years, 1937, 1938, 1939, and 1941 crops were secured from the farmers by contact. The author believes that he received correct information in at least 95% of the cases. Only the rest being doubtful.

## 3. Assembly of final cover map.

All permanent or axis cover is in dark blue or dark brown. This cover includes all types of timber, marsh, brush, permanent herbaceous plants and blue grass not pastured. Travel lanes are also indicated on permanent map.



WASHTENAW COUNTY





## CLASSIFICATION OF TYPES BASED ON ORIGIN AND SUCCESSION

H. M. Wight  
School of Forestry and Conservation

Origin From LandUpland Type A

- 4 Grasses
- 5 Herbaceous plants
- 6 Shrubs
- 7 Oak-hickory
- 8 Oak-hickory-maple
- 9 Beech-maple

Sand Dunes W

- 1 Drifted sand
- 2 Grasses
- 3 Herbaceous mixed
- 4 Shrubs
- 5 Forest

Origin From Open WaterLakes B

- 1 submerged vegetation
- 2 Floating vegetation
- 3 Emergent vegetation
- 4 Reed marsh
- 5 Sedge marsh
- 6 Sedge-grass
- 7 Mixed herbaceous
- 8 Herbaceous shrub-sedge

Bog Phase D

- 1 Floating vegetation
- 2 Bog (Spagnum-sedge bog)
- 3 Emergent vegetation  
(on submerged mat)
- 4 Reed bog
- 5 Shrub bog (leather-leaf bog)

## E

Stream Flood Plain

- 1 Mixed herbaceous
- 2 Shrubs
- 3 Willow-poplar
- 4 Elm-maple-ash
- 5 Beech-maple

Seepage Areas S

- 1 Sedges
- 2 Mixed herbaceous
- 3 Shrub
- 4 Tamarack
- 5 Elm-maple-ash
- 6 Beech-maple

Swamp Phase C

- 1 Shrub
- 2 Willow-aspen or tamarack
- 3 Elm-maple-ash
- 4 Beech-maple

Bog Phase D

- 6 Tamarack-poison sumac
- 7 Swamp evergreens-spruce-tamarack
- 8 Shrubs
- 9 Aspen
- 10 Elm-yellow birch-maple
- 11 Beech-maple
- 12 Grass (cleared and drained)

Kettle Holes K

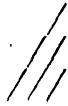
- 0 Open water
- 1 Greases
- 2 Herbaceous
- 3 Shrubs

Miscellaneous

- Abandoned a
- Cropped c
- Evergreen plantings e
- Deciduous plantings d
- Orchard or
- Pasture p
- Individual trees x
- Open water o

Fence Rows

- Clear or light
- Medium
- Heavy



Timber Size

- 4" to 6" (DBH)
- 7" to 10" (DBH)
- Etc.

Cropped Lands

- Alfalfa al Garden gr
- Beans b Oats o
- Barley br Potatoes pot
- Buckwheat bw Sweet Clover sw
- Beets be Timothy t
- Corn cr Wheat w
- Clover cl

Timber Stocking

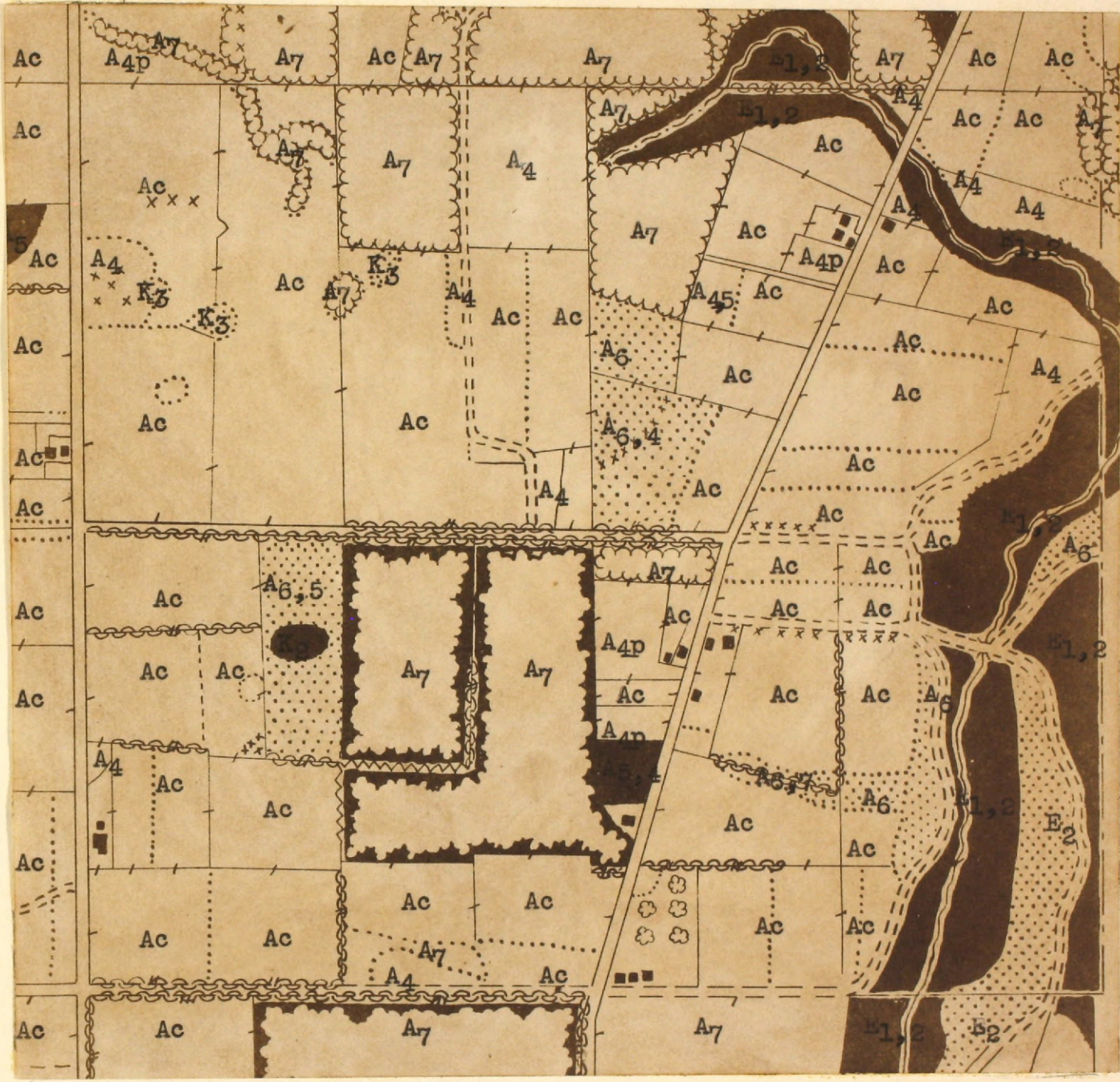
- Scattered /
- Medium //
- Heavy ///

Underbrush Density

- Scattered =
- Medium =
- Heavy =



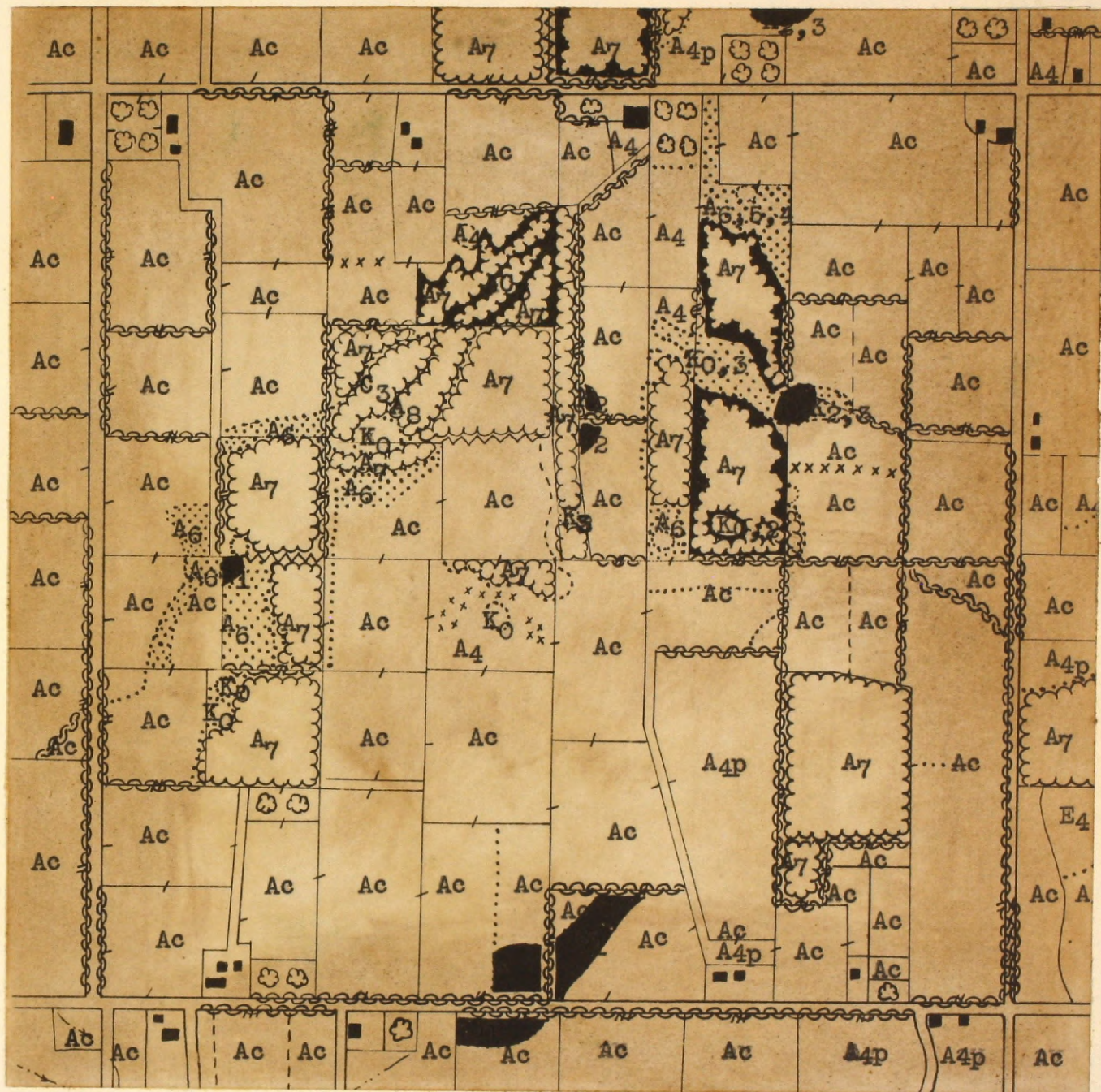
COVER MAP



Section XXIV, Ann Arbor Township, Washtenaw County  
Scale 6" = 1 mile  
(Insulation strip bordering section 6.5 chains)  
Legend pp.16 and 17



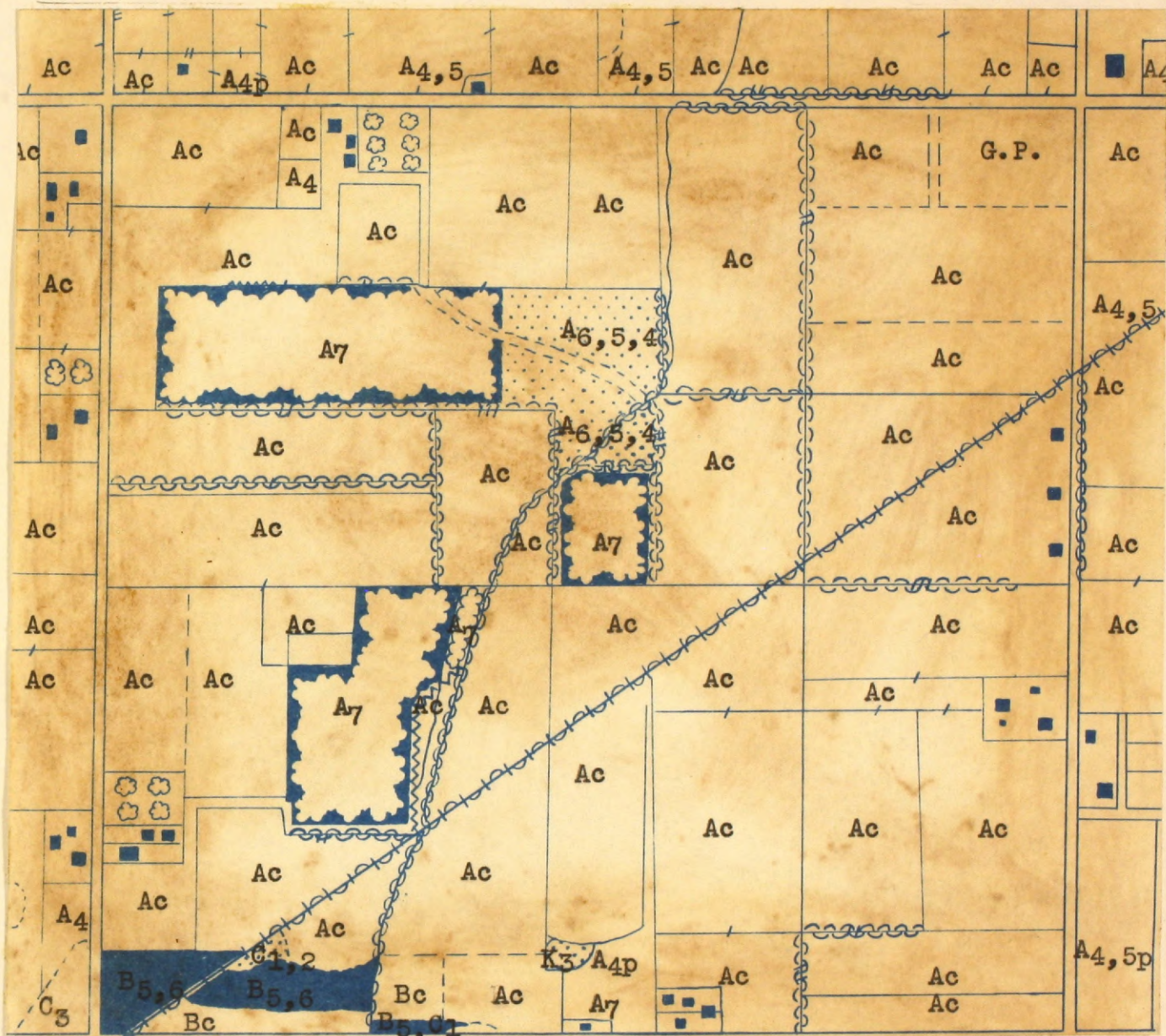
COVER MAP



Section X, Lodi Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section 6.5 chains)  
 Legend pp. 16 and 17



COVER MAP

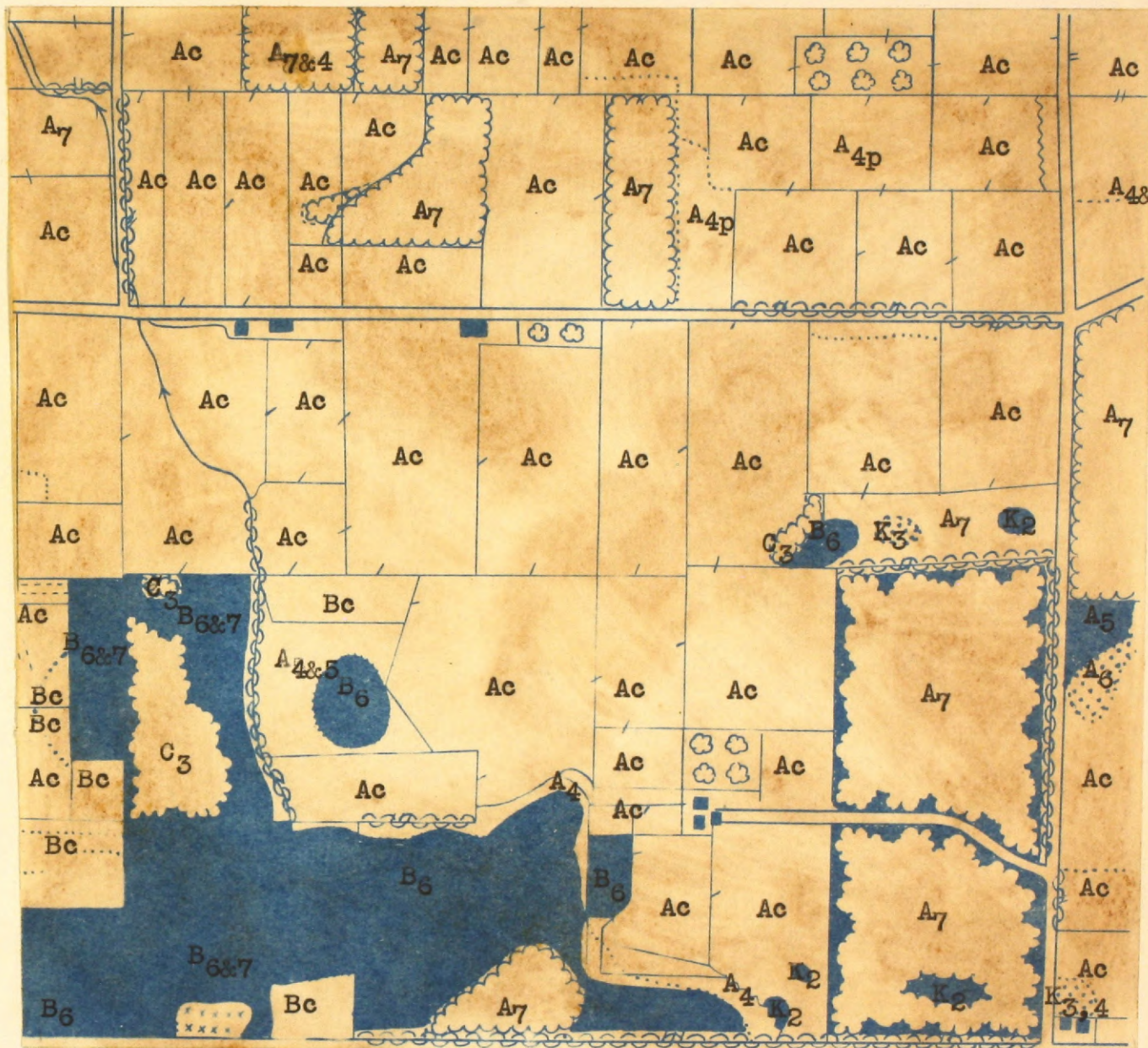


Section XV, Pittsfield Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section 6.5 chains)  
 Legend pp. 16 and 17





COVER MAP



Section XXVIII, Scio Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section 6.5 chains)  
 Legend pp. 16 and 17

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Volume**



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All rotated crops appear in contrasting colors. Hay types are broken down into eight different types. All grain crops appear independently as all having an individual color.

### Present Rotations

#### 1. Types of Rotations

One main rotation was found throughout all the areas. The six year rotation is very closely followed in ninety percent of the cases. The six year rotations are found in Table XIII, p. 26.

The first rotation is one followed in more than three-fourths of the cases. Timothy and clover is the usual hay crop, and at the end of the third year the clover begins to drop out of the crop. Where alfalfa is used extensively, it is usually left for a period of four years. At the end of that time, the alfalfa stand will usually begin to thin out, but the author knows of stands that are still good at the end of six or more years.

Where livestock is a more important factor on the farm the last rotation is used in many cases. This rotation will give twice the usual amount of corn, and the fertility can be maintained on good soils. In a few cases no rotations are followed, but this is due to soil type or topography.

#### 2. Factors effecting rotations.

Topography and Soil. Usually in cases where the rotation is not followed it is due to soil type or topography.

TABLE XIII

1st. yr.	2nd. yr.	3rd. yr.	4th. yr.	5th. yr.	6th. yr.
Corn	Oats, or Barley	Wheat or barley	Timothy & Clover or Alfalfa or Timothy or Other Hay	Timothy & Clover or Alfalfa or Timothy or other hay	Timothy & Clover or Alfalfa or Timothy or other Hay
Corn	Oats, Wheat, Barley	Alfalfa or Timothy	Alfalfa or Timothy	Alfalfa or Timothy	Alfalfa or Timothy
Corn	Oats or Barley	Corn	Wheat	Clover or Timothy & Clover	Clover or Timothy & Clover

On marsh soil of the muck type, corn usually is planted year after year, because the small grains grow too rank and will not stand to be cut. After grain goes down it doesn't fill well.

In some portions of sections ten and eleven of Sharon Township the topography is too steep for binders. In these cases the small grains are eliminated and alfalfa is seeded in the corn. This type of land should be retired from cultivation, and will be discussed later.

#### Location and Nearness to Industrial Centers

The distance a farmer is from a shipping center will also affect rotations. Trucking becomes greater at longer distances and many farmers feed their grain into livestock, thus less trucking. Farmers will tend to raise more livestock, and more grass crops will be needed for pasture. Within ten to fifteen mile radius of large industrial centers, farmers will raise more truck crops for the domestic trade.

#### Undeterminable Factors

The undeterminable factors are those included under weather. These factors cannot be cared for in the planning of a rotation, and when any element affects the crop, the farmer many times has to alter his rotation. Clover seed may be sown in a cover crop, and the weather may be too dry, not allowing the younger clover plants to obtain moisture from the soil. As a result many plants die. Even after the grain

crop is harvested, the weather may continue dry or become dry, and if the young clover is not already gone, it still may not survive. Then no grass crop is established and the field has to be put back into grass or many times the farmer interrupts it further by planting corn.

Since winter wheat is sown entirely in Southern Michigan, a severe winter without much snow, or no snow at the proper time, may result in winter killed wheat. Then the field will usually be sown to oats, rye, or barley. Many times the clovers may be winter killed and thus interrupting the rotation.

#### Crop Percentages

Discussion of crop percentages are taken from charts

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, page 29, 30, 31, 32, 33, 34, 35, 36, 37, 38 and 40. The crops were taken for a period of five years, namely 1937, 1938, 1939, 1940, and 1941. First a base map was palimtered to obtain acreages of each field. The crop maps were colored to show the relation of one crop to another. The crops were then added for each year by sections, and percentages calculated. Tables are found on pp. 19-20

The cover was divided into two classes: namely, rotated and non-rotated cover. Part of the non-rotated cover will be known from now on as a pivot cover. The non-rotation cover includes marsh, timber, blue grass, brush, farmyard, orchard and gravel pit. In the cases of pivot cover, it will eliminate gravel pits, orchards, farmyards, pastured blue-grass and timber without sufficient underbrush.













CROP AND/OR COVER TYPE ACREAGES AND PERCENTAGES FOR SECTION 33, SCIO TOWNSHIP,  
1937, 1938, 1939, 1940, AND 1941

Cover	1937		1938		1939		1940		1941		Average	
	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area
Rotated Cover												
Corn	88.80	13.9	89.50	14.0	53.90	8.4	91.00	14.2	102.20	16.0	85.10	13.5
Oats	64.8	10.1	38.20	6.0	63.30	8.4	33.70	5.3	59.40	9.3	49.90	7.8
Wheat	77.3	12.1	42.60	6.7	44.10	6.9	59.40	9.3	51.30	8.0	54.90	8.6
Barley	----		-----		-----		23.00	3.6	7.30	1.1	6.00	0.9
Rye	----		-----		-----		-----		-----			
Timothy and Clover	99.8	15.6	107.10	16.7	69.70	10.9	46.60	7.3	72.70	11.4	79.20	12.4
Alfalfa	13.4	2.1	17.70	2.8	31.60	4.9	21.40	3.3	38.20	6.0	24.50	3.8
Timothy	19.6	3.1	48.30	7.5	73.50	11.5	53.70	8.3	23.40	3.7	43.60	6.8
Clover	8.2	1.3	34.00	5.3	34.00	5.3	48.90	7.6	34.60	5.4	31.90	5.0
Timothy and Alfalfa												
Clover and Alfalfa												
Sweet Clover												
Sudan Grass					-----							
Soybeans	----		3.90	0.6	3.90	0.6	3.90	0.6	3.90	0.6	3.10	0.5
Garden	----		1.5	0.2	1.50	0.2	4.4	0.7	-----		1.50	0.2
A <sub>5</sub> Herbaceous (Abandoned)	0.7	0.1	0.7	0.1	0.70	0.1	0.7	0.1	0.70	0.1	0.70	0.1
Sorghum												
Non-Rotated Cover												
Marsh	123.3	19.3	112.4	17.6	112.40	17.6	102.20	16.0	102.20	16.0	110.50	17.3
Timber (Non-Cover)	66.8	10.4	66.8	10.4	66.80	10.4	66.8	10.4	66.80	10.4	66.80	10.4
Timber (Cover)	22.3	3.5	22.3	3.5	22.30	3.5	22.3	3.5	22.30	3.5	22.30	3.5
Al <sub>4</sub> (Grass)	30.3	4.7	30.30	4.7	47.60	7.4	37.80	5.9	30.3	4.7	35.30	5.4
Brush	15.3	2.4	15.3	2.4	15.30	2.4	15.3	2.4	15.30	2.4	15.30	2.4
Farm Yard	4.8	0.7	4.8	0.8	4.80	0.8	4.8	0.8	4.80	0.7	4.80	0.7
Orchard	4.6	0.7	4.6	0.7	4.60	0.7	4.6	0.7	4.60	0.7	4.60	0.7
Gravel Pit												
Total	640.0	100.0	640.0	100.0	640.0	100.0	640.0	100.0	640.00	100.0	640.00	100.0

CROP AND/OR COVER TYPE ACREAGES AND PERCENTAGES FOR SECTION 1, SHARON TOWNSHIP,  
1937, 1938, 1939, 1940, AND 1941

Cover	1937		1938		1939		1940		1941		Average	
	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area
Rotated Cover												
Corn	108.5	17.0	84.80	13.2	104.2	16.3	97.3	15.2	130.2	20.3	105.0	16.4
Oats	49.6	7.8	50.50	7.9	64.8	10.1	60.2	9.4	37.8	5.9	52.6	8.2
Wheat	41.0	6.4	41.00	6.4	65.6	10.2	48.2	7.5	36.4	5.7	46.4	7.3
Barley	----		----		20.5	3.2	29.8	4.7	20.5	3.2	14.2	2.2
Rye	----		----		----		----		7.0	1.1	1.4	0.2
Timothy and Clover	64.8	10.1	97.00	15.2	54.5	8.6	27.0	4.2	22.0	3.5	53.1	8.3
Alfalfa	38.7	6.0	64.70	10.1	29.5	4.6	39.0	6.1	72.5	11.3	48.9	7.7
Timothy	38.7	6.0	8.50	1.3	----		21.5	3.3	15.0	2.3	16.7	2.6
Clover	8.0	1.3	16.30	2.5	8.0	1.2	24.1	3.8	41.3	6.5	19.5	3.0
Timothy and Alfalfa	----		----		11.0	1.7	11.0	1.7	11.0	1.7	6.6	1.0
Clover and Alfalfa												
Sweet Clover												
Sudan Grass												
Soybeans												
Garden	----		1.0	0.2	0.7	0.1	1.7	0.3	1.7	0.3	1.0	0.2
A <sub>5</sub> Herbaceous (Abandoned)	0.6	0.1	0.6	0.1	0.6	0.1	0.6	0.1	0.6	0.1	0.6	0.1
Sorghum	-----		-----		-----		-----		7.0	1.1	1.4	0.2
Thistle	5.0	0.8	5.0	0.8	5.0	0.8	5.0	0.8	----		4.0	0.6
Non-Rotated Cover												
Marsh	107.1	16.7	106.1	16.6	97.6	15.3	96.6	15.1	93.5	14.6	100.2	15.7
Timber (Non-Cover)	74.9	11.7	74.9	11.7	74.9	11.7	74.9	11.7	74.9	11.7	74.9	11.7
Timber (Cover)	13.5	2.1	13.5	2.1	13.5	2.1	13.5	2.1	13.5	2.1	13.5	2.1
A <sub>4</sub> (Grass)	70.9	11.1	57.40	9.0	70.9	11.1	70.9	11.1	36.4	5.7	61.3	9.6
Brush												
Farm Yard	11.5	1.8	11.5	1.8	11.5	1.8	11.5	1.8	11.5	1.8	11.5	1.8
Orchard	7.2	1.1	7.2	1.1	7.2	1.1	7.2	1.1	7.2	1.1	7.2	1.1
Gravel Pit												
Total	640.0	100.0	640.0	100.0	640.0	100.0	640.00	100.0	640.0	100.0	640.0	100.0

CROP AND/OR COVER TYPE ACREAGES AND PERCENTAGES FOR SECTION 2, SHARON TOWNSHIP,  
1937, 1938, 1939, 1940, and 1941

Cover	1937		1938		1939		1940		1941		Average	
	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area
Rotated Cover												
Corn	42.6	6.7	94.90	13.80	95.90	15.0	92.90	14.5	72.90	11.4	79.8	12.5
Oats	85.4	13.4	120.80	18.9	58.30	9.1	86.20	13.5	71.70	11.2	84.5	13.2
Wheat	58.1	9.1	38.60	6.0	42.80	6.7	22.00	3.4	59.70	9.3	44.2	6.9
Barley	26.3	4.1	4.8	0.8	-----		13.10	2.0	9.2	1.5	10.7	1.7
Rye	-----		-----		-----		9.20	1.4	-----		1.8	0.3
Timothy and Clover	93.2	14.6	68.40	10.7	57.70	11.8	66.50	10.4	32.4	5.0	67.3	10.2
Alfalfa	82.3	12.9	55.30	8.6	97.30	15.2	72.20	11.3	86.6	13.5	78.8	12.4
Timothy	5.4	0.8	12.80	2.0	16.70	2.6	13.60	2.1	11.1	1.7	11.9	1.9
Clover	2.3	0.4	-----		10.70	1.7	56.50	8.8	81.4	12.8	30.2	4.7
Timothy and Alfalfa												
Clover and Alfalfa	-----		-----		10.80	1.7	10.80	1.7	-----		4.3	0.7
Sweet Clover												
Sudan Grass												
Soybeans	-----		-----		-----		-----		11.0	1.7	2.2	0.4
Garden	6.0	0.9	6.00	0.9	6.00	0.9	6.00	0.9	7.40	1.2	6.3	1.0
A <sub>5</sub> Herbaceous (Abandoned)												
Sorghum												
Non-Rotated Cover												
Marsh	100.7	15.7	104.10	16.3	94.60	14.8	73.90	11.5	68.40	10.7	88.30	13.8
Timber (Non-Cover)	29.20	4.6	29.20	4.6	29.20	4.6	29.20	4.6	29.20	4.6	29.20	4.6
Timber (Cover)	24.80	3.9	24.80	3.9	24.80	3.9	24.80	3.9	24.80	3.9	24.80	3.9
A <sub>4</sub> (Grass)	59.0	9.2	55.60	8.7	52.60	8.2	38.40	6.0	49.50	7.7	51.0	8.0
Brush	0.7	0.1	0.70	0.1	0.70	0.1	0.70	0.1	0.70	0.1	0.70	0.1
Farm Yard	20.60	3.2	20.60	3.2	20.60	3.2	20.60	3.2	20.60	3.2	20.60	3.2
Orchard	2.0	0.3	2.00	0.3	2.00	0.3	2.00	0.3	2.00	0.3	2.0	0.3
Gravel Pit	1.40	0.2	1.40	0.2	1.40	0.2	1.40	0.2	1.40	0.2	1.40	0.2
Total	640.00	100.0	640.00	100.0	640.00	100.0	640.00	100.0	640.00	100.0	640.0	100.0





CROPS AND/OR COVER TYPE ACREAGES AND PERCENTAGES FOR SECTION 11, SHARON TOWNSHIP,  
1937, 1938, 1939, 1940, AND 1941

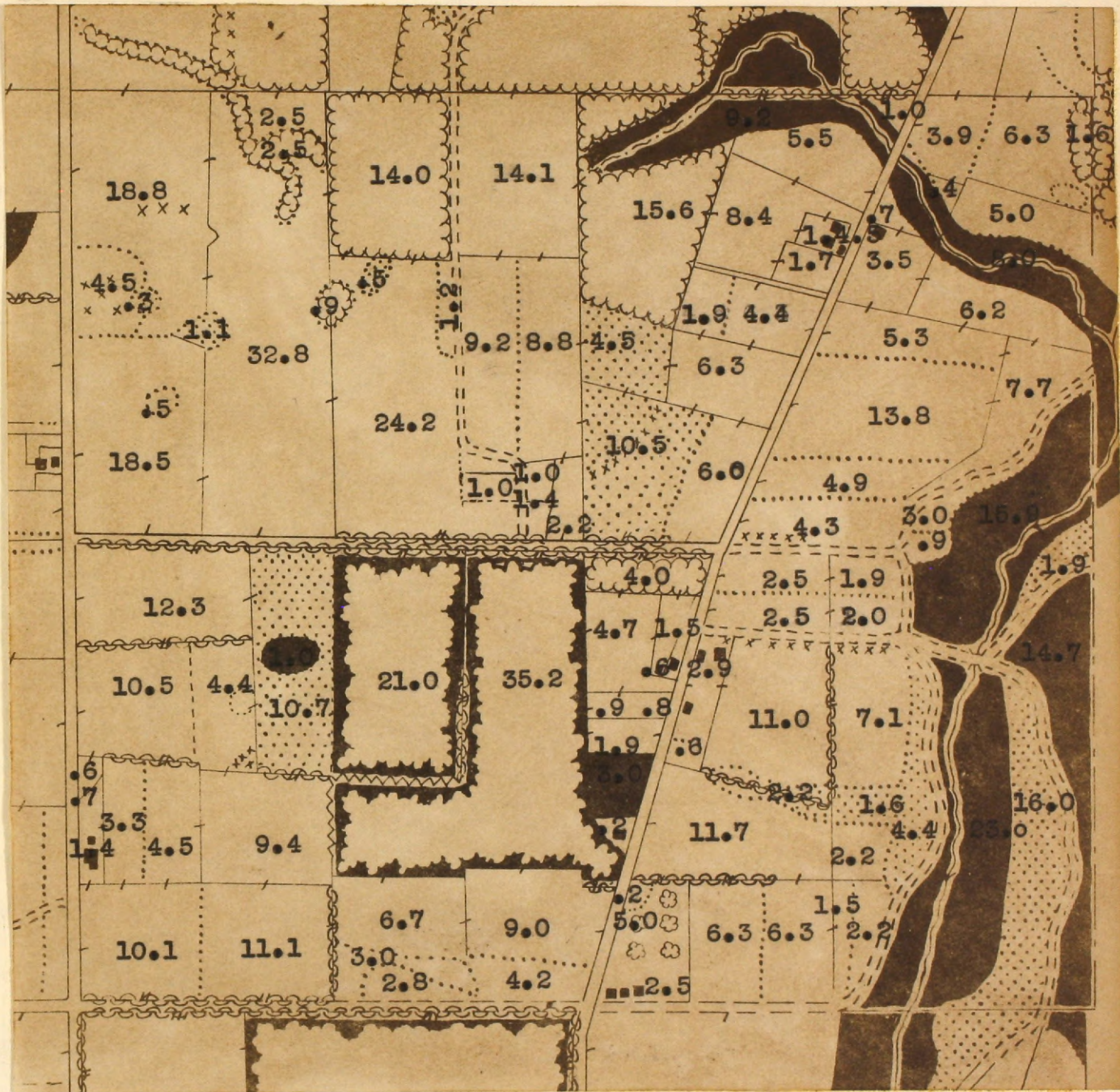
Cover	1937		1938		1939		1940		1941		Average	
	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area	Acres	Percent of Land Area
Rotated Cover												
Corn	72.90	11.4	37.50	5.9	40.50	6.4	54.80	8.6	66.80	10.5	54.5	8.5
Oats	38.10	6.0	41.30	6.5	54.90	8.6	22.00	3.5	22.10	3.5	35.7	5.6
Wheat	17.30	2.7	16.70	2.6	26.50	4.1	20.00	3.1	20.00	3.1	20.1	3.1
Barley												
Rye												
Timothy and Clover	30.60	4.8	44.10	6.9	7.30	1.1	12.90	2.0	15.00	2.4	22.0	3.4
Alfalfa	55.40	8.7	57.30	8.9	78.80	12.3	54.10	8.6	61.20	9.6	61.4	9.6
Timothy	4.30	0.7	26.00	4.1	4.30	1.1	7.30	1.1	7.30	1.1	9.8	1.5
Clover	7.30	1.1	9.80	1.5	-----		32.60	5.1	33.40	5.2	16.6	2.6
Timothy and Alfalfa	-----		-----		3.10	0.5	-----		3.10	0.5	1.2	0.2
Clover and Alfalfa												
Sweet Clover	10.80	1.7	10.80	1.7	10.80	1.7	10.80	1.7	6.00	0.9	9.9	1.6
Sudan Grass	-----		-----		-----		12.40	1.9	-----		2.5	0.4
Soybeans	-----		-----		5.40	0.8	4.70	0.7	-----		2.0	0.3
Garden	0.50	0.1	0.50	0.1	.50	0.1	0.50	0.1	-----		0.4	0.1
A <sub>5</sub> Herbaceous (Abandoned)	1.30	0.2	1.30	0.2	-----		1.30	0.2	-----		0.8	0.1
Sorghum												
Non-Rotated Cover												
Marsh	76.50	11.9	76.50	11.9	76.50	11.9	76.50	11.9	75.10	11.7	76.20	11.9
Timber (Non-Cover)	88.30	13.8	88.30	13.8	88.30	13.8	88.30	13.8	88.30	13.8	88.30	13.8
Timber (Cover)	38.70	6.0	38.70	6.0	38.70	6.0	38.70	6.0	38.70	6.0	38.70	6.0
A <sub>4</sub> (Grass)	147.70	23.0	140.90	22.0	154.10	24.1	152.80	23.8	152.70	23.8	149.6	23.4
Brush	39.50	6.2	39.50	6.2	39.50	6.2	39.50	6.2	39.50	6.2	39.50	6.2
Farm Yard	8.40	1.3	8.40	1.3	8.40	1.3	8.40	1.3	8.40	1.3	8.40	1.3
Orchard	2.40	0.4	2.40	0.4	2.40	0.4	2.40	0.4	2.40	0.4	2.40	0.4
Gravel Pit												
Total	640.00	100.0	640.00	100.0	640.00	100.0	640.00	100.0	640.00	100.0	640.0	100.0





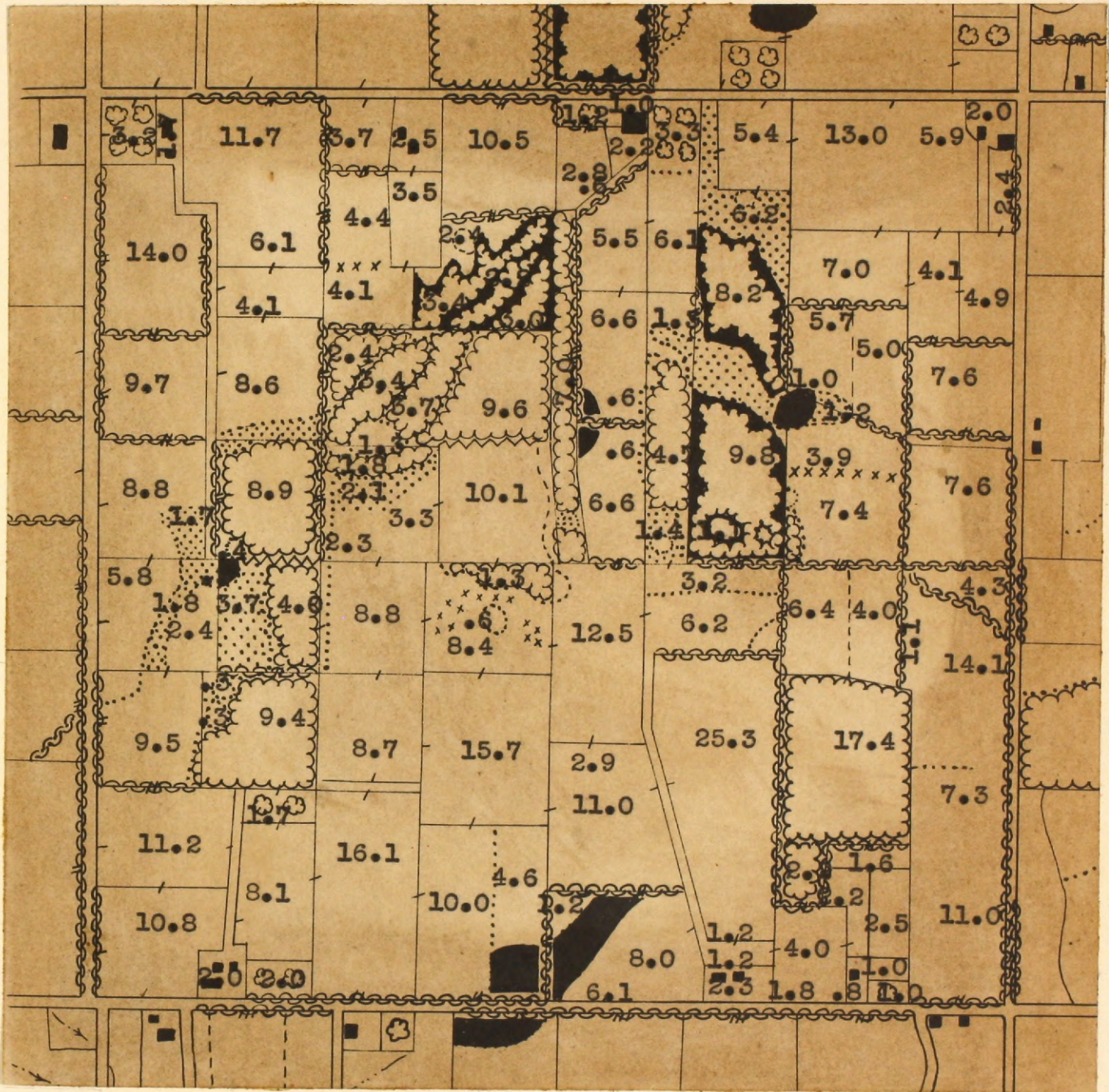


ACREAGE MAP



Section XXIV, Ann Arbor Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)

ACREAGE MAP

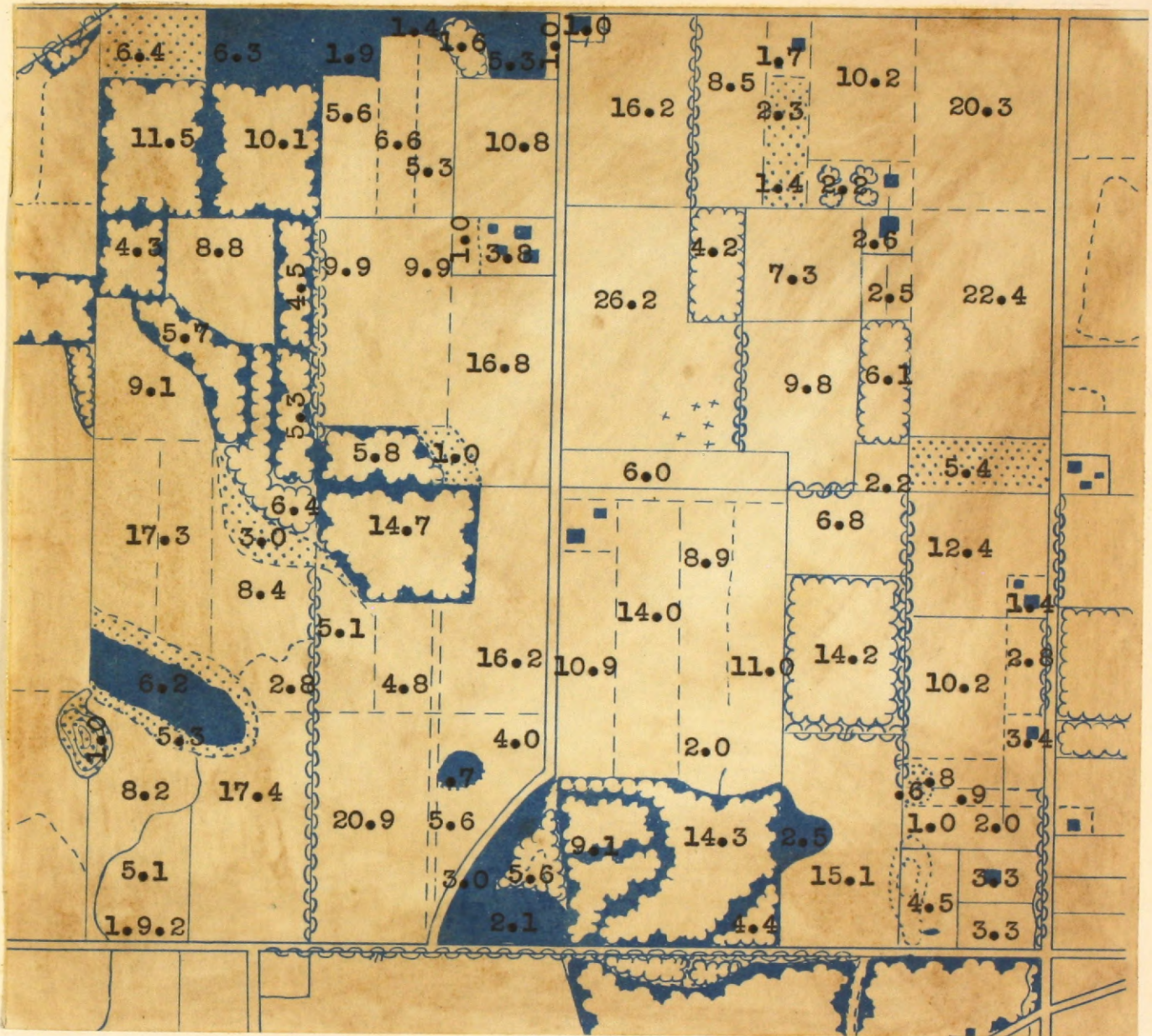


Section X, Lodi Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)





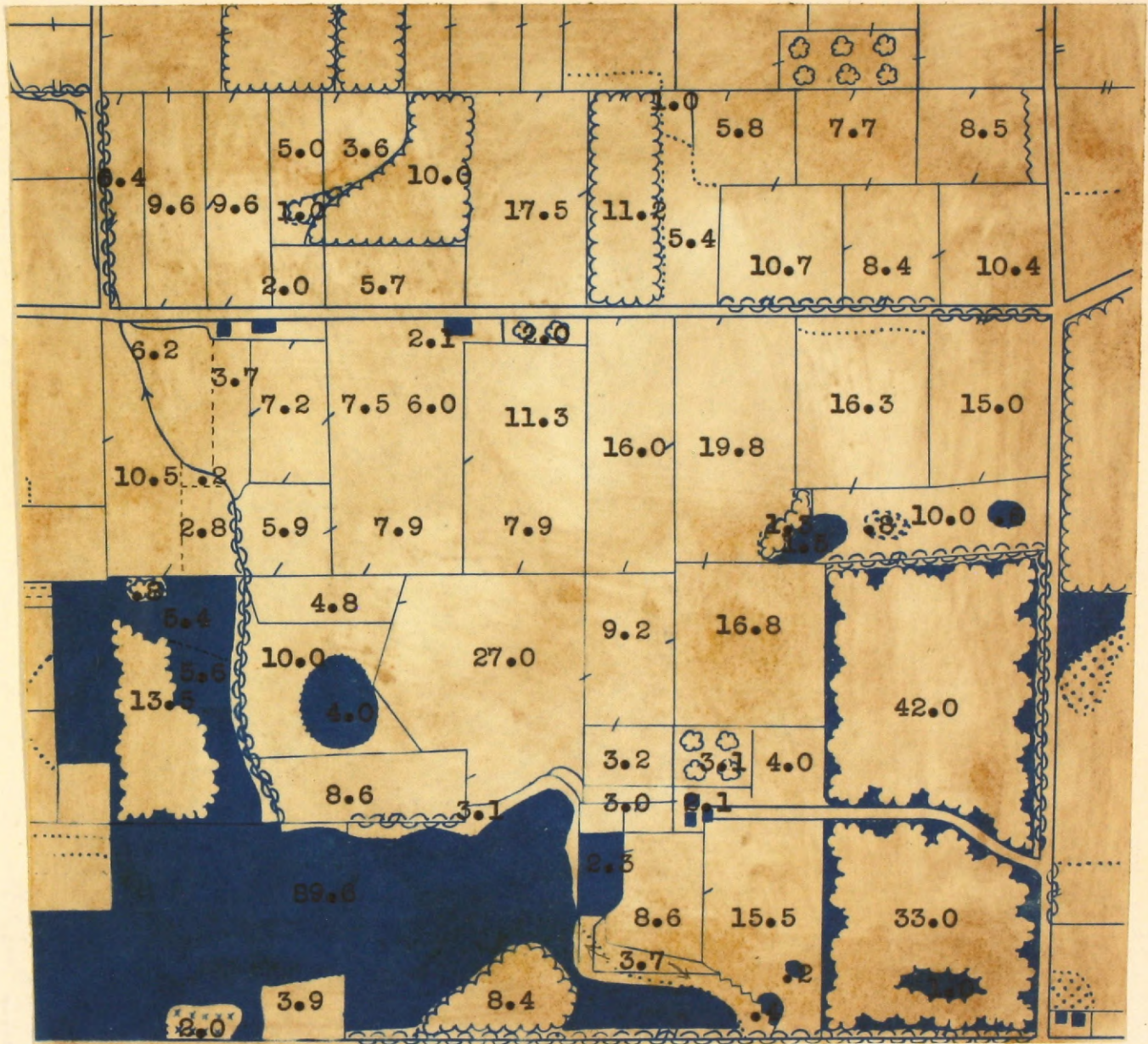
ACREAGE MAP



Section XXII, Pittsfield Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)



ACREAGE MAP



Section XXVIII, Scio Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)

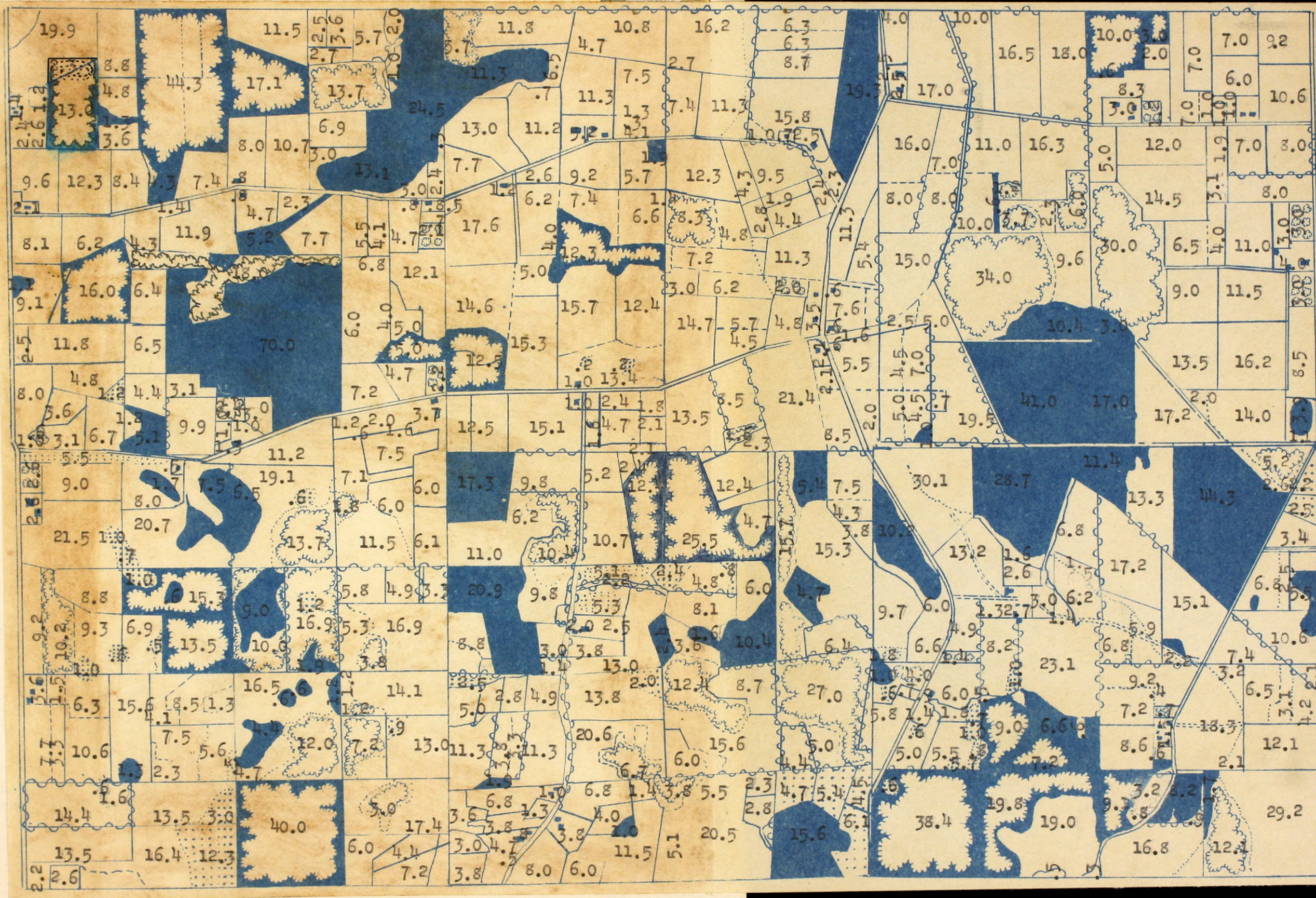


ACREAGE MAP



SECTION XXXIII, Scio Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)

ACREAGE MAP



Sec. 1, 2, 3, 10, 11, 12, Sharon Township, Washtenaw County

3	2	1
10	11	12

Sec. Arrangement Scale 4" = 1 mile



In the case of non-rotated cover, it comprises from 21.2% to 80.8% of cover of a section. The average percentage of non-rotated cover for the twelve sections amounts to 46.7%. In the case of 80.8% of non-rotated, it contains 43.4% of permanent blue grass and is heavily pastured. The next highest percentage of non-rotated cover is 63% and 23.4% of it is permanent blue grass.

The next highest contributing factor to non-cover is that of timber (non cover) ranges from 1.1% to 13.8% by sections, and averages 7.85% for the entire twelve sections.

Of the rotated cover, the sections range from 19.2% to 78.5%, or an average of 53.3% in cultivated (rotated) crops for the twelve sections. Washtenaw County, as given by the Agricultural census, 1941, has 47.7% of its crop land harvested. It will be noted that the author used areas where little better farmland was found. The northwest townships of Washtenaw County contains a higher percentage of pastured land, lakes and marshes thus raising the rotated cover. Corn ranks first in the percentage of acres. Corn composed from 3.5% to 16.4% of the entire land area of the section, or from 13% to 28.3% of the entire acreage of rotated crops for the five year period. The average percentage for corn of the entire land acreage was 11.5%, or 21.7% of the acreage for rotated crops.

The next single crop, next highest in percent of acreage was oats. It comprised 9.5% of the entire land area, or 17.9% of the total rotated acreage. Oats ranged by section from 2.2% to 13.2% of the entire land area.

Wheat was fourth as the next single crop and it composed 6.4% of the entire land area, ranging from 2.1% to 11.9%. In terms of rotated acreage, wheat composed 12.1% of the acreage.

Barley and rye are very minor in point of acreage. Some years, neither of the two crops would appear in the acreage. The two combined composed less than 0.8% of the entire land area, or 1.4% of the rotated acreage.

The group of crops that are next in line for the highest percentages of land area are the hays. The crop/or cover type chart will show these broken down into timothy and clover and alfalfa. Three other types appear in the chart that may be used as hay at different times, but they mainly are used for pasture, soil-builder or for seed. Any of the first six hay types are often used for pasture, either as permanent pasture for the summer or as temporary pasture in the fall after hay has been made.

Of these six hay types, timothy and clover ranks first in acreage. It composed 7.95% of the entire land area. It ranges by section from 0.5% to 17.1% of the entire rotated acreage, or averaged 14.9% of the rotated acreage.

Alfalfa was second in acreage; it composed 6.5% of the entire land area or 12.2% of the rotated acreage. Alfalfa ranged by section from 1.2% to 14.3% of the entire land area.

The individual timothy type and individual clover type were next in size of acreage, and were practically the same. They both made up a 3.3% each of the entire land area or 6.2% of the rotated acreage. Clover was more uniform in acreage, section by section.

The remaining two types, timothy and alfalfa, and clover and alfalfa were small in area. They composed 2.1% and 1.3% respectfully of the rotated acreage or 1.15% and 0.7% of the entire land area.

In summing up the total hay type areas, they composed 42.9% of the entire rotated acreage of the twelve sections.

The remaining types of the rotated acreage consists of sweet clover, sudan grass, soybeans, garden, herbaceous (follow land) and sorghum. They composed only 2.5% of the entire land area or 4.7% of the entire rotated acreage.

### Cropping Practices

#### Corn

The different practices of cropping land with corn is extremely important to the pheasant. With 11.5% of the entire land area of the twelve sections in corn, a large population of pheasants could be maintained if all other influencing factors were equal. One of these influencing factors is how the corn is raised and harvested.

During the planting season some waste grain is left lying on the ground, due to carelessness in filling planter boxes, dropping corn after the shoe is lifted, etc. The pheasant during this season will feed upon the waste grain, but this is a minor consideration in relation to how the corn is harvested.

Most of the farmers in southern Michigan do not raise sufficient hay for the livestock, so most, if not all, of the corn has to be cut for fodder or ensilage. The percent of corn that goes into ensilage would not effect the pheasant, because its acreage is small. The corn is cut in September and shocked. If the weather is good, most of the corn will be shredded by November 15. The smaller percentage of shocked corn to be husked by hand will be done by late October. In unusual instances, as in 1940, many farmers began using hybrid corn and after they had cut it and shredded some they found out that the stocks took longer to cure than the previously raised corn. This accounted for most of the corn standing out through the winter of 1940 and 1941. A very small percentage of the corn in southern Michigan is shucked from standing stocks, thus the cornfields give no cover to the birds. Most of the corn now shucked off of standing stocks is done by a mechanical picker, which creates poor cover. One advantage of a corn-picker is that it gives more waste grain to the birds.

The grain is in the form of shelled grain, as the fields are usually checked over and all ears are picked up. This amounts to three and four bushels to the acre, and at times more.

### Small Grain

Wheat, oats, rye, barley and soybeans when raised for seed and straw will be considered small **grain**. One-half of the present acreage of small grains are cut by binders, shocked and threshed by grain separators. The remaining acreage is harvested by combines.

Wheat, oats, rye, and barley are all harvested within a period of six weeks unless wet weather sets in after cutting begins. Much waste grain is left in the field through considerable handling. First it is cut, and if very ripe some of it will shatter in the cutting. Some will shatter in shocking, and then more will shatter in threshing by loading it on wagons to haul it to the separator. The total amount of this wasted grain will give considerable food for the pheasant. In normal seasons and wet seasons the weeds will soon grow and excellent cover will be given the pheasant.

Waste grains from combines are usually not as great as by cutting with binder, unless the grain has gone down badly. Most combines can care for broken straw and down grain. Stubble from combines are usually four inches to six inches higher than that cut by binder. This gives the pheasant more cover

and protection while feeding on waste grain and weed seed. Also, grain to be combined gives the hen a longer period for hatching and percent of hatches will be greater than in fields cut by binders.

### Hay

Six different hay types will be considered, and will be discussed in the order they should be cut, if any order can be given them.

Alfalfa will be cut first and is usually ready by June 10-15, pheasants hatching in alfalfa will have the poorest chances for hatching success, because hatching is in its peak then. Also, if any renestings appear after the second cut has begun to grow, it will obviously have less chance for hatching. The second cut is usually ready between July 15-25. This is only a period of thirty-five to forty days, and two weeks elapse before it has grown enough to conceal the bird. That leaves a maximum of twenty-five days for laying and hatching. Alfalfa is usually considered poor cover for goods hatches of pheasant clutches.

Most of the alfalfa is cured in the field and then loaded on wagons and hauled to the barn. More progressive farmers cure the hay in the field and use a pick-up bailer and bail it in the field. The bails are then gathered and stored in the barn. Some green alfalfa is being cut and put in silos

for ensilage. Cutting of green alfalfa would effect the nesting of the pheasant more.

Clover and alfalfa would probably be cut next, although depending upon the percentages of each. The alfalfa would be dead ripe and the clover would still be green. This type would give additional time for pheasant clutches to be hatched. Clover and alfalfa would receive the same method of harvesting. The only difference in relation to pheasant populations would be the later day of cutting, adding to a longer hatching period.

Timothy and alfalfa would probably be the next hay type to be cut. It would receive the same type of harvesting as previously discussed hays, but would give the pheasant a longer period for hatching, and more successful clutches would be the result.

Clover would probably be the next hay type to be cut, followed by timothy and clover, and then timothy. These would all receive the same method of harvesting, and all can easily be bailed in the field by a pick-up bailer. Clover hay would probably be ready for cutting between July 1 to July 15; timothy and clover between July 10 to July 25; and timothy between July 15 to July 30. These three types will give the pheasant a better place to secure higher successes in hatchability of clutches.

English, 1932, in Southern Michigan, found that 62.2% of all nests studied were in hayfields.

Leedy, 1938, in Ohio found alfalfa to rank first in number of nests per one hundred acres or 13.8; and other hay types were second with 12.8. He also found that 52% of nests were found in hay meadows. In 1939, he found that 56% of all nests were in hay meadows.

### Pasture

Two classes of pastures will be considered, that of permanent type and that which appears in the rotations.

The permanent type of pasture is the blue grass. Over 90% of the permanent pastures are over grazed, and hence no cover is left for wildlife. The only time permanent pastures are not over-grazed is during seasons of much rain. The growth is unusually fast and cover will become sufficient to be of some value to the pheasant, but not for nesting purposes. Regions where most of the permanent pastures occur are heavily populated with sheep. These pastures are not rotated normally and the grass is eaten rather closely.

The other type of pasture is that which appears in the rotation, and is usually one of the clovers. All of the crop type of clovers considered previously are used for pasture, along with sudan grass and sweet clover. This clover type, be it one of a mixed type, pure type or alfalfa, are usually used for hay the first year, and pastured the second



or third year. Many times hay is cut from the meadow and then after a few weeks the cattle are turned in because the permanent pasture growth has been consumed.

### Field Arrangement in Southern Michigan

#### Present Method

The method of field arrangement in southern Michigan was well founded by the early settlers. The fields have been arranged by the earlier settlers, and arranged well enough to care for present day farming and needs. In many instances fields were not as large, but when the tractor came into use, many fences were removed, thus creating less fields but larger. Fields are so arranged as to size so as to have at least one field of corn, one field of oats, one field of wheat, one field for hay and one for pasture. Arrangement is made so the fields may easily be reached from the barnyard.

### Factors Affecting Field Arrangement

#### Natural Features

Since southern Michigan lies in the glaciated plains portion of the Central Lowlands province of the United States, it consists of moranic uplands and glacial lake bottoms. As seen from tables (1-12) marsh type comprises from 1.3% to 32.8% by sections for the entire land area, and averages 13.1% of the entire land area. Also on the twelve sections studied, 16.7%

of the entire land area is in timber types. Also, 2.9% of the area is in brush. This makes a total of 32.7% of the entire area in cover of natural features to be considered in the arrangement of fields.

## 2. Location of Farmstead

Farmsteads are usually located adjacent to roads. Fields are then so arranged that they may be reached easily from the farmstead. If the farm is rectangular in shape the fields are usually reached by a lane leading to them. In some cases the fields are reached by a road adjacent to them. In cases where farms are square in shape many of the fields are adjacent to the buildings while others are reached by lanes.

## 3. Size of Individual Farms

Farms in southern Michigan vary in size from a few acres to one thousand acres in size. On the areas studied the smallest farm is fifteen acres in size, while the largest farm is two hundred and thirty-six acres. The size of the field usually increases or decreases in proportion to the size of farm. Several tracts smaller than the fifteen acres appear on these areas, but they do not contain buildings, and are usually holdings of timber. Larger the farms the larger the field, so as a result the number of fields remain more or less constant to a certain extent.

## 4. Soils and Topography

As mentioned before much of Southern Michigan contains old lake bottoms and kettleholes. These are of different soil type

and class than the surrounding upland. When such soil types as the mucks occur they are kept in one field or two fields as much as possible. Upland soil types are also kept as much as possible to other fields. This facilitates in plowing, working ground, cultivating crops and the harvesting of crops.

Topography parallels soil types, or vis versa from the standpoint in considering field arrangement. Soils of the uplands are broken in fields, and soils of bottom lands are broken into fields.

#### 5. Type of Farming

The type of farming will bear or have its effect upon the arrangement of fields. A beef cattle farm will arrange pasture fields to be of sufficient size to carry the herd for a sufficient length of time. Fields are larger on beef farms. Fields are also larger on dairy farms, and are usually connected with the farmstead. Grain farms usually have permanent lanes or temporary ones established through fields to reach fields that are at the back of the farm. Many grain farms are receiving larger fields to facilitate the use of tractors, and as a result farming is more economical.

#### Effect Upon the Pheasant

##### 1. Location to Pivot Cover

The location of crops to pivot cover is one of extreme importance and is one of the important points under study. Pivot cover is that of marshes, timber with sufficient

underbrush, brush, grass, and herbaceous that are not pastured. Fields so arranged to meet, connect, or lie adjacent will give to the pheasant, areas to feed, nest, and raise their young. The plan in mind is to have as much of the rotated crop area as possible connect with the pivot cover. In some instances all fields cannot be planned to aid the pheasant since most of the marshes and timber with sufficient underbrush lie at the back of the farm.

2. Fence Rows--Probable Use for Travel Lanes.

<sup>Table</sup>  
~~Chart~~ No. IV, page 60, will give the total length of travel lanes on each section. Travel lanes are fence rows having sufficient brush or herbaceous material to give a pheasant sufficient protection and cover while walking a fence row. The length of travel lanes on an area is important, but may not be of any value unless these lanes connect areas of food and cover. A picture of the dispersion of these travel lanes and the value they give can be seen from any of the cover or crop maps previously referred to. If pivot cover is good and travel lanes are dispersed so as to lead to nesting covers and feeding areas, they serve their purpose well.

TABLE XIV  
Length of Travel Lanes for Studied Areas

Area	Length (Miles)
Sharon 1	3.4*
Sharon 2	2.4*
Sharon 3	0.5
Sharon 10	1.4
Sharon 11	4.7*
Sharon 12	2.6*
Pittsfield 15	4.7
Pittsfield 22	1.9
Lodi 10	4.6
Scio 28	2.3
Scio 33	1.0
Ann Arbor 24	2.6

\*These sections contain duplicate lanes, i.e. travel lanes on section lines are duplicated.

#### How Farming Operations Affect Pheasants

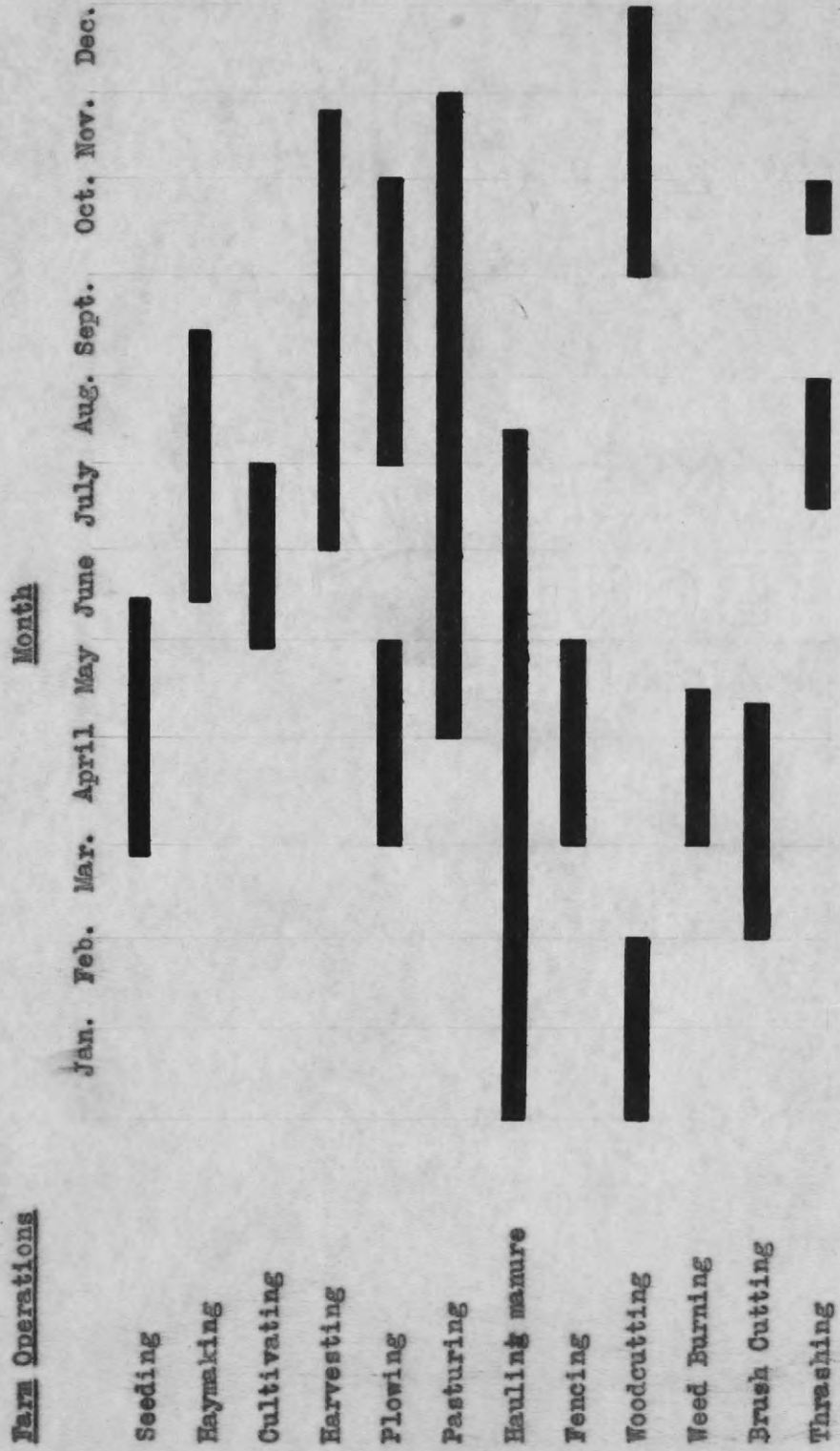
Farming operations of various kinds occur throughout the year. There are different degrees of effect upon the pheasant, but they all have their effects. Some are beneficial, while others are harmful. Some operations are both harmful and beneficial. Twelve farming operations are considered, and chart No. 1, giving the time of year when they are carried out, is found on page 61.

#### Seeding

Seeding is an operation that is almost entirely beneficial to the pheasant. The first seeding comes in March and is known as clover seeding. Clover seed is sown at this time in the winter wheat, and in clover fields where the

CHART I

Schedule of Farm Operations



farmer wants to increase the quality of his stand. The seed is sown usually by a hand seeder, and the seed falls upon the ground, some of it falling in cracks. The pheasant will secure some of this seed that does not fall in cracks.

Next seeding is oats. April is the months for this seeding, and it usually starts around the first of the month. Some clover seed is sown in the oats at this time, but usually the bulk of the waste grain for the birds is oats. The waste is not high in the number of bushels, but a pheasant will secure many feedings in a freshly sown oats field. No cover is afforded the pheasant in a freshly sown oats field, but most fields sown into oats are corn ground from the previous field, and most corn fields afford poor cover if any cover at all during April.

Corn planting would be the next seeding in line. The pheasant will again benefit from this planting as waste grain will be left in the field. The planting operation will have no effect on the birds from the standpoint of molestation, because they very seldom use an area having no cover. The pheasant will benefit from the corn field for a week or two, depending upon the pheasant population.

The next seeding is that of winter wheat and barley. This seeding occurs from September 20 to October 5, mainly. The birds may be disturbed a little if they have been using

the field previously which undoubtedly was oats that previous summer. Stubble may have been sufficiently high for protection, and they fed there for weed seed, and possibly oats and insects. The oats ground is usually plowed so this disturbance would come under plowing. On the other hand birds will benefit greatly by the waste wheat that is usually found lying at both ends of the field.

### Haymaking

Haymaking plays an extremely important part in the life role of the pheasant. Since around 55 to 60% of pheasant nests have been found in hayfields, it plays its important part in furnishing nesting cover.

On the other hand the pheasant is greatly menaced, due to the fact that most clutches are in the incubation period during the haying season. English, 1932, found that only 44% of all nests observed in hayfields were successful. The remaining 56% were destroyed through cutting, or the cutting has caused the pheasant to desert her nest. Some of the unsuccessful attempts may be due to poor incubation, unfertile eggs, or weather conditions.

Besides the loss of clutches due to mowing, many hens are either killed or crippled.

Wight, 1930, p. 222, reports the percentages of all birds seen in April, May, June, July, and August in hayfields to be



respectfully: 17.2%, 16%, 40.7%, 36.7%, 28.1%.

### Cultivating

The only crops cultivated in southern Michigan are corn and sorghum. Corn cultivation begins during the last few days in May and lasts until the last of July. Since the pheasant very seldom visits the corn field at this time of the year, cultivation does not affect the life of the pheasant directly. However, the bird may be affected indirectly through cultivation. If cultivation is continued frequently and late, the cornfield will be clean of weeds, and this eliminates some of the food supply.

### Harvesting

Harvesting in this discussion will effect oats cutting, wheat cutting, rye cutting, barley cutting, corn cutting, corn picking, corn shucking, and soybean cutting or combining.

Winter barley and rye usually are first of the ~~small~~ grains to ripen, and generally precedes wheat by a few days. Wheat is next in riping, and these grains ripen between July 4 and July 15. Oats usually ripens between July 20 to July 30.

Two methods of harvesting are used mainly in Southern Michigan. These two are by the grain binder or combine. Other methods are pasturing and making hay from these grains. Grain fields are important for nesting areas of the pheasant. English, 1932, reports 5.1% of all nests observed were in

grainfields and 4.3% in grain stubbles. He records a 71% success of hatching in grain fields and complete failure in grain stubble. This point cannot be considered seriously, since the nests were few in number.

Leedy, 1938, in a survey of 15 counties in Ohio, reports 81.9% of all nests found in wheat fields cut by binder were successful, and 56% by combine, or an average of 75.9%. He also states that only 3.3 hens were killed per one hundred nests, and six hens crippled in wheat fields cut by binders. In wheat fields harvested by combines, eleven hens per 100 nests were killed and eight hens crippled per 100 nests.

Ensilage cutting is the next operation in the line of harvesting. It usually begins about the middle of August and continues into the early part of September, depending on the time of the planting of the corn. The acreage of corn going into ensilage is usually small and does not effect the pheasant considerably.

Corn cutting begins around the first of September and continues throughout the month. The corn is ripe at this time and pheasants begin to move in. By removing the cover and putting it into shocks will expose the birds and they, as a result confine their trips to the cornfields for shorter periods and usually just in the morning and evening for feeding. Wight, 1930, p. 222, records 36.7% of the birds seen the month of September was in cornfields. A little cutting may

continue into October. During October the cornfields are not usually used by man, thus less molestation to the pheasant. Wight, 1930, p. 222, reports 30% of the birds seen in October to be in cornfields.

Corn shredding is done mainly in November. Wight, 1930, pp. 222, records only 2.4% of the birds observed in November to be in cornfields. The activity of corn shredding may be one reason for this low percentage but it was also noted that over 56.7% were observed in swamps in November. November is the month for the grouping of pheasants into flocks.

Corn picking and corn shucking begins about the tenth of October and continues into November. Much waste corn results from mechanically picked corn. Waste corn in the form of ears results with hand picked corn, but most farmers pick up the lost ears.

Better cover results from hand picked corn, than mechanically picked corn, while no cover generally results from cornfields when the corn is cut except for weeds.

Soybean harvesting if harvested for seed, occurs from the last of October to the middle of November. All beans should be combined or thrashed by the first week in November unless weather conditions do not permit. The soybean acreage is low, but the cover afforded the pheasant by the soybean before harvesting is good. Most soybeans that are raised for seed, are combined in southern Michigan while the remainder are cut by mower and thrashed by grain separators.

### Plowing

Plowing also plays its part in relation to the pheasant. It begins usually around the first of April and continues through until the last of May then again in August, September, and October. Ground plowed at this time is in preparation for the seedbed for corn, oats, soybeans, and wheat. Early plowing will not effect the pheasant as much as later plowing. Through plowing cover is destroyed, usually nesting areas. Different types of clover sods are the bulk of the plowing, but some herbaceous areas, grass, and corn stubble are plowed. It is true that great amount of cover is destroyed, but nests are sometimes destroyed through plowing. English, 1932, reports a 5.79% of 138 nests were destroyed by plowing, and, 1933 he reports a 9.09% loss of fifty-five nests by plowing.

### Pasturing

Pasturing also effects the pheasant through the destruction of cover and destruction of nests. English, 1932, found 2.9% of 138 nests observed to be in pastures. Fifty percent of these were successful.

If pasture fields are handled carefully and not pastured too heavy, the bird will benefit from the cover for protection and nesting. Cattle may disturb some birds in nesting, while others may not be disturbed. The type of pasture will also

play an important part for the pheasant. Sweet clover will give a rank growth, and livestock will not keep it down as well as mixed clovers, alfalfa, or blue grass.

### Hauling Manure

Hauling manure may occur any time throughout the year, but the season when it is concentrated is from the first of December until the middle of August. It is true that a more concentrated season appears from February until June. Some farmers will continue to clean their barns, and haul the manure to the field immediately as made throughout the entire winter. Most farmers will store their manure in piles beside the barn or in the stockyard until winter begins to break, and haul it into the field.

During April, some farmers will begin cleaning out the stockyard, which holds an accumulation of the past winter's manure. This results from the cattle during the winter. They are turned in the stockyard during the day. The farmer beds the cattle in the stockyard from the straw-pile that has been threshed there the previous summer. It is the farmer's plan to have his stockyard cleaned by threshing time so the fresh stack can be blown in the stockyard. Some farmers do not get this chore done, so sometimes the manure will be hauled out following the threshing season.

Since most farmers feed some corn to cattle and sheep, and all farmers feed corn to horses and hogs during the winter months, the manure content will yield corn. This manure hauled

out in the field during winter months provides a chief source of food for the pheasant.

Mr. Morgan, Section 15 in Pittsfield Township, one of the areas studied by the author, practically fed a flock of some twenty pheasants through the winter by the habit of cleaning his barns out each week.

Another incident, hardly classed as manure hauling, but producing the same effects, was also produced by Mr. Morgan. Mr. Morgan had some silage to spoil for him during the winter. It was not fit for cattle feed so he hauled it out a few rods from his barn. During the month of February, the author observed a flock of 25 to 30 pheasants feeding on the spoiled ensilage.

### Fencing

Fencing is a farm chore usually carried out during the month of April and May. The work does not start before the ground is "frost-free" and carries through until the "busy-season" begins. During this season, the pheasants begin their early nesting. Fencerows receive a large percentage of early nests due to a large amount of old grass, herbaceous and brush material.

English, 1932, found 9.4% of 138 nests in fencerows. Fence building at this time of the year usually results in the destruction of many nests. English did find that 71% of the nests found in fence rows were successful. Other causes of mortality in fence rows may often be due to predators, as

they use fence rows for travel lanes. Hawks and crows also use fence posts for observation and resting perches.

### Woodcutting

The woodcutting season usually begins in October and lasts until March. This farm operation is saved until the slack season of the farm appears. Many farmers "cut-up" wood for their home use.

Since pheasants use woodlots considerably during winter, when woodlots contain sufficient cover, the activity of woodcutting will cause birds to be molested and may even cause them to leave the woodlot entirely due to the cutting activity. Wight, 1930, p. 222, records the greatest use of woods by pheasants to be from April to September conclusive. An average of 13.6% of the birds observed for the months April, May, June, July, August, and September were in the woods type.

### Weed and Marsh Burning

Weed and marsh burning is resorted to quite frequently. The burning usually starts around the first of April and lasts until the middle of May. Many farmers are of the opinion that it is for the best that all dead material should be burned. Very frequently marshes are burned over to remove the last year's foliage. This may have its benefits, but the author has failed to see them. It is true that the ~~area~~ appears to have more life when the new foliage begins, but the loss in fibrous material to the soil is not calculated.

Birds at this time of the year need all old foliage they can find, a new growth has not begun. Pheasants use weed patches, fence rows and marshes for early nesting. English, 1932, found 3.6% of 138 nests observed in marshes.

### Brush Cutting

**Brush** cutting is usually a minor operation on the farm and many years it may not occur. It may take place to create more area for pasturing, cleaning fence rows to build more fence, or cleaning kettle holes.

Pheasants prefer a brush habitat in their life cycle, and birds are often flushed from these areas. They create good cover for the pheasant and the seeds of some of the brush species create minor food patches. English, 1932, reports a pheasant built a nest on a brush pile, but it was destroyed by burning.

Wight, 1930, records an average range of 4.6% to 35.8% of birds seen by months for the entire year in the brush type, or an average of 17.8%.

### Threshing

Threshing is an operation usually carried out within a week or two after the grain has been cut, providing the grain is not combined. The height of the nesting season is usually passed now (July 15 to August 15), but the late nestings may appear now in stubble fields. If the threshing does not occur, until two or three weeks after cutting, pheasants may nest in



the stubble fields. Also, the birds may be feeding here quite extensively, and the removal of the shocks may disturb their feeding in this field for a few days.

The author observed many young birds feeding in oats and wheat stubble field that were combined. A group of forty young birds were flushed on August 10, 1941, from a freshly combined oats field. They seemed to be feeding together, and all flushed at practically the same time.

### Pheasant Status on the Areas

#### Method of Study

Five methods of study were used to assert the pheasant population on the areas. They were as follows: droppings at roosts, location of flocks, actual observations on individual birds, location by crowing and by a spring dog census.

No actual work was done on the pheasant during the hunting season, but it was started after the birds had flocked. Flocks were located throughout the winter, and roosts were studied to determine where the birds were located. No census was made to determine the actual number of birds in the winter population. Three flocks ranging from 20 to 30 birds were located on the area, and another of more than 100 birds was located on the one of the area and adjacent to it. Most of the birds of this large flock were located in marsh, brush, and timbered areas, 150-200 acres in size, on the east side of section 24, Ann Arbor Township and also section 19 Superior Township. The owner of the land fed more than 150 bushels of corn

to these wintering birds. The birds, after wintering, leave for breeding areas. This accounts for the high breeding population in section 24, Ann Arbor Township.

Actual observations were made on birds during breeding seasons to note **what** areas were being used.

#### Population Census

A spring dog census was begun on March 20, and the last section was completed on April 22. Three sections out of the twelve were censused by two dogs and two men. While the remaining nine sections were censused by one dog and one man.

Length of time to census a section of land ranged from 3 hours and 10 minutes to 5 hours and 15 minutes. Table XV, page 74. The time consumed to census the 3 sections of land, worked by 2 dogs, was 3 hours, 30 minutes, 3 hours, 50 minutes and 4 hours. Only four sections were censused in less than four hours, and two of these were done by a two dog census. One section required five hours or more to census, as this was the first section to be censused by the author. The remaining seven sections required from 4 hours to 4 hours and 15 minutes.

The census table, Table XV, page 74, is considered a good census. It was checked by a crowning census, but practically all data was received through the dog census.

Only one section of the twelve sections had no breeding population. Breeding populations on the remaining eleven sections ranged from 3 to 46 birds, with an average of 13.42 birds

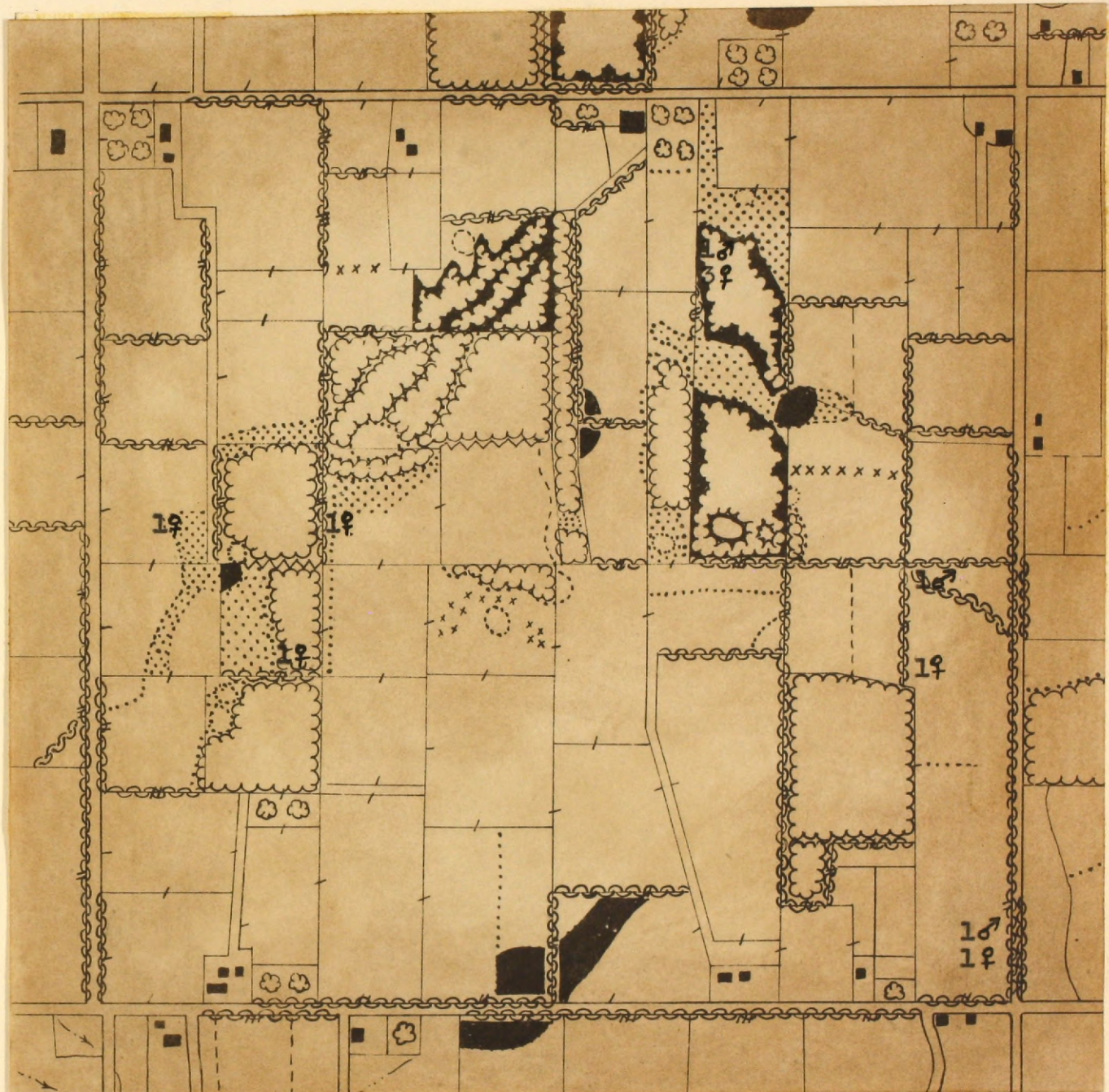
TABLE XX ✓  
 SPRING PHEASANT CENSUS OF TWELVE RANDOM PICKED  
 SECTIONS IN WASHTEENAW COUNTY

Township	Sec.	Date Censused	Weather	Census by	Time Consumed	Hens by Census	Cocks by Census	Total Birds	Acres	Sex Ratio
Ann Arbor	24	Apr. 22	Clear & Sunny	2 dogs	4 hrs.	29	17	46	14	1:1.7
Lodi	10	Apr. 19 & 20	Rainy & Warm	1 dog	4 hrs. 10 min.	8	3	11	58	1:2.7
Pittsfield	15	Mar. 20	Clear & Cool	1 dog	4 hrs.	12	3	15	43	1:4
Pittsfield	22	Mar. 20	Clear & Cool	1 dog	5 hrs. 5 min.	18	4	22	29	1:4.5
Scio	28	Apr. 17	Cloudy & Cool	1 dog	3 hrs. 10 min.	0	0	0	---	-----
Scio	33	Apr. 17	Clear & Cool	1 dog	4 hrs.	8	3	11	58	1:2.7
Sharon	1	Apr. 15	Cloudy & Cool	1 dog	3 hrs.	4	1	5	128	1:4
Sharon	2	Apr. 14	Rainy & Cool	1 dog	50 min. 4 hrs.	8	5	13	49	1:1.6
Sharon	3	Apr. 12	Cloudy & Cool	2 dogs	3 1/2 hrs.	4	3	7	91	1:1.3
Sharon	10	Apr. 11	Cloudy & Cool	1 dog	4 hrs.	3	0	3	213	0:1
Sharon	11	Apr. 10	Clear & Cool	1 dog	4 hrs. 15 min.	10	2	12	53	1:5
Sharon	12	Apr. 9	Cloudy & Cool	2 dogs	3 hrs. 50 min.	13	3	16	40	1:4.3
Average						9.75	3.67	13.42	48	1:2.7





CENSUS MAP



Section X, Lodi Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)  
 Legend, p.

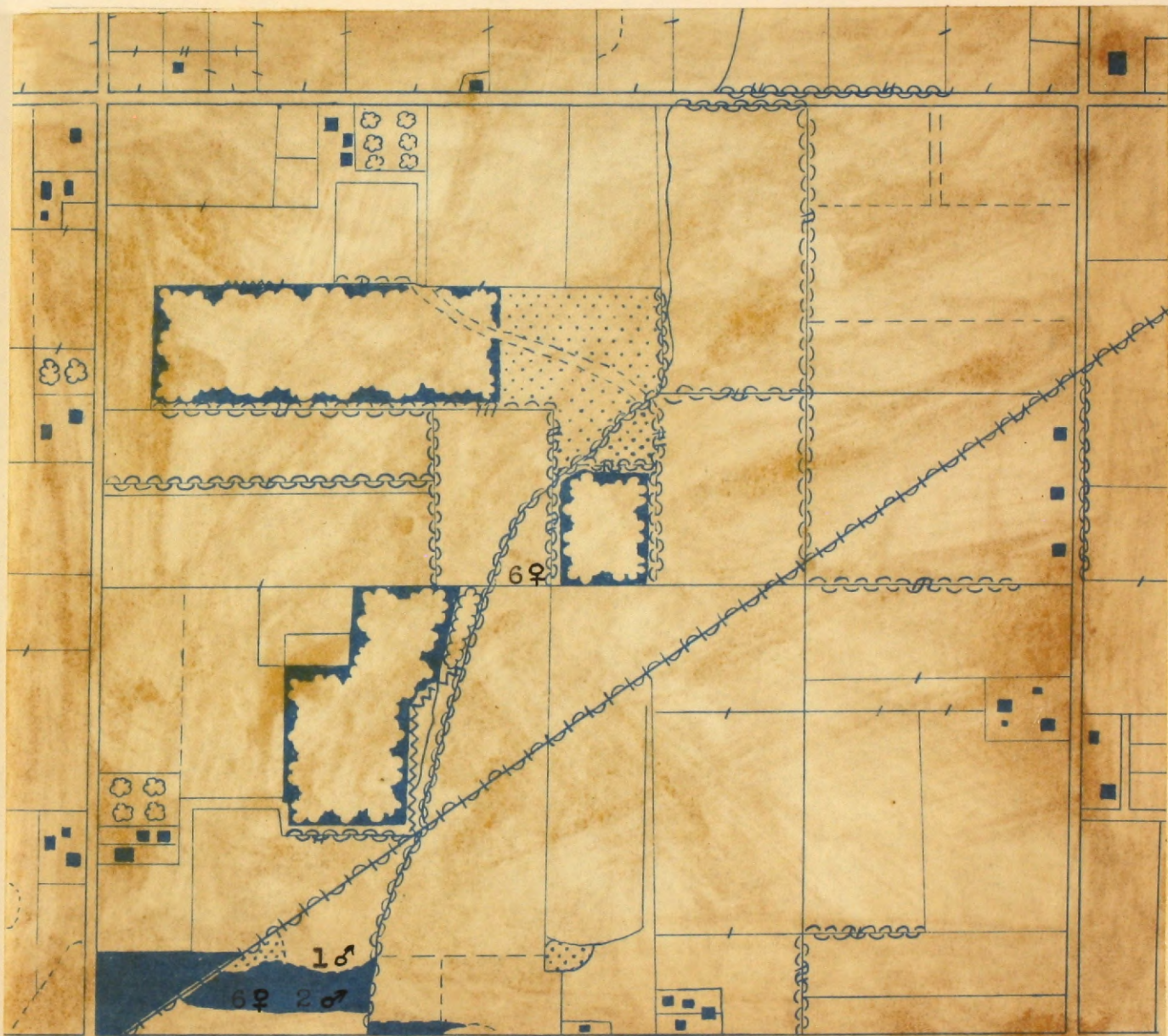
♂ Male

♀ Female

N



CENSUS MAP



Section XV, Pittsfield Township, Washtenaw County  
Scale 6" = 1 mile

(Insulation strip bordering section, 6.5 chains)

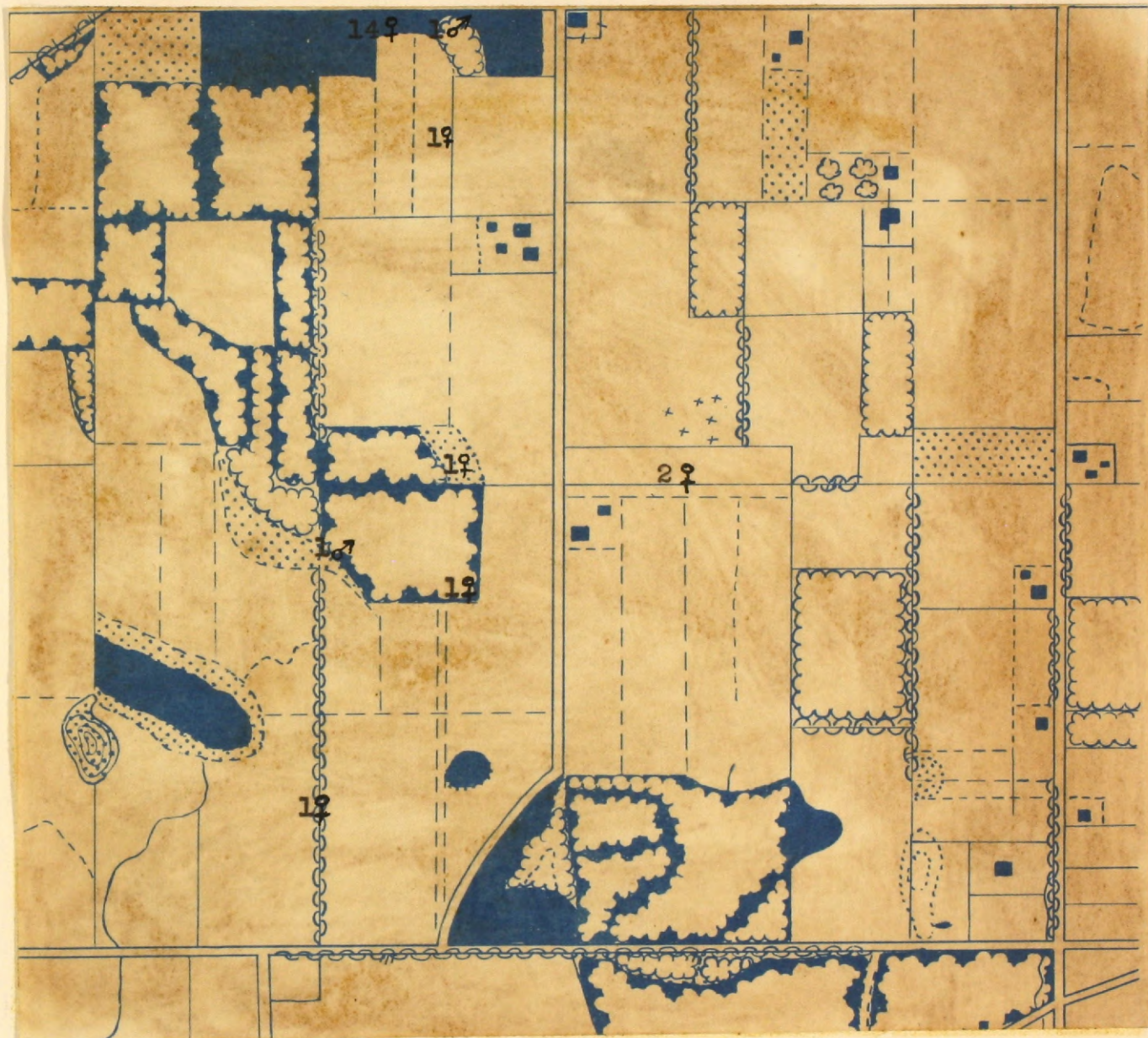
Legend

♂ Male

♀ Female



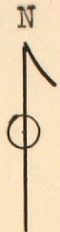
CENSUS MAP



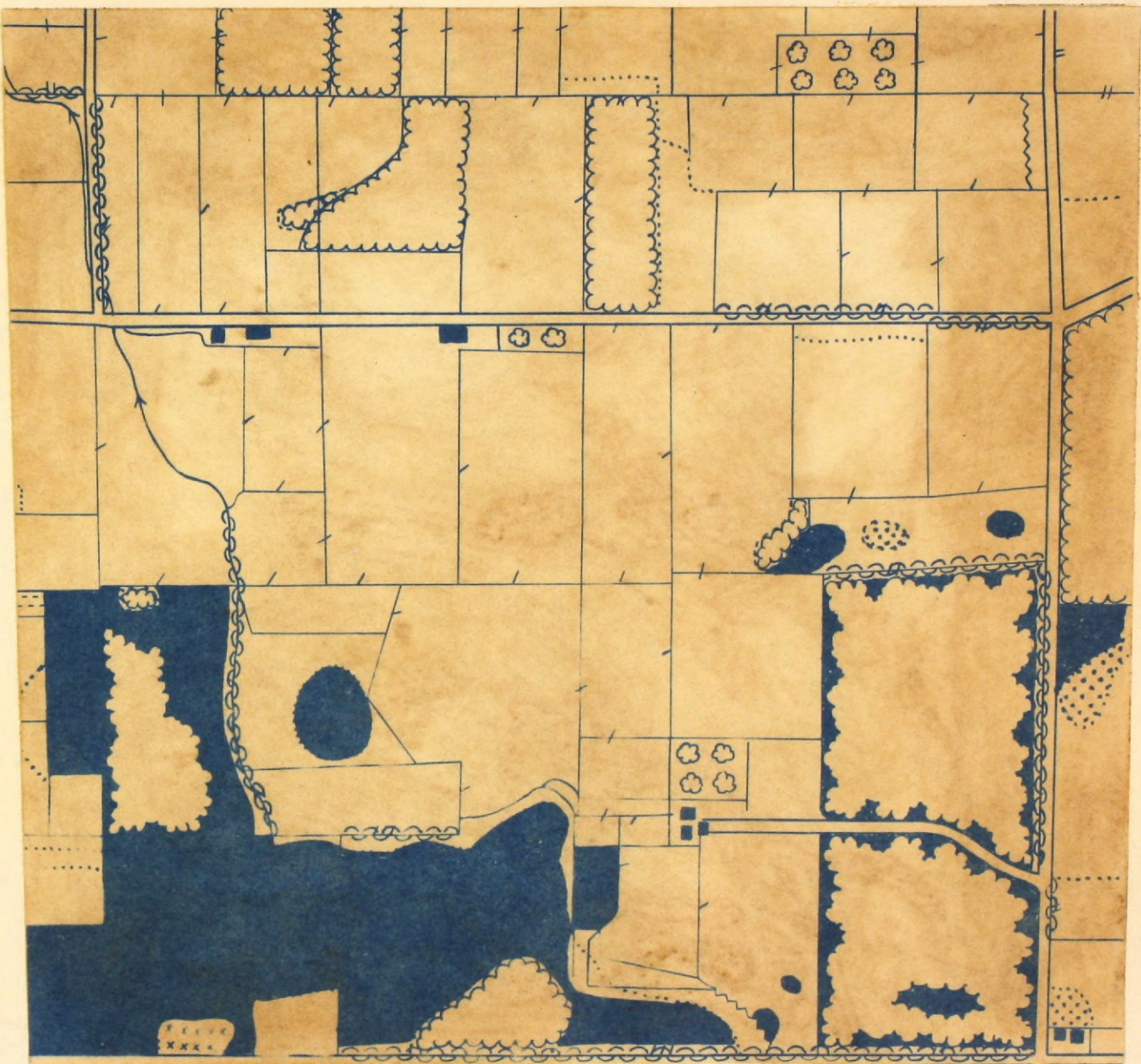
Section XXII, Pittsfield Township, Washtenaw County  
Scale 6" = 1 mile  
(Insulation strip bordering section, 6.5 chains)  
Legend

♂ Male

♀ Female



CENSUS MAP

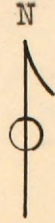


Section XXVIII, Scio Township, Washtenaw County  
Scale 6" = 1 mile  
(Insulation strip bordering section, 6.5 chains)  
Legend

♂ Male

♀ Female





CENSUS MAP



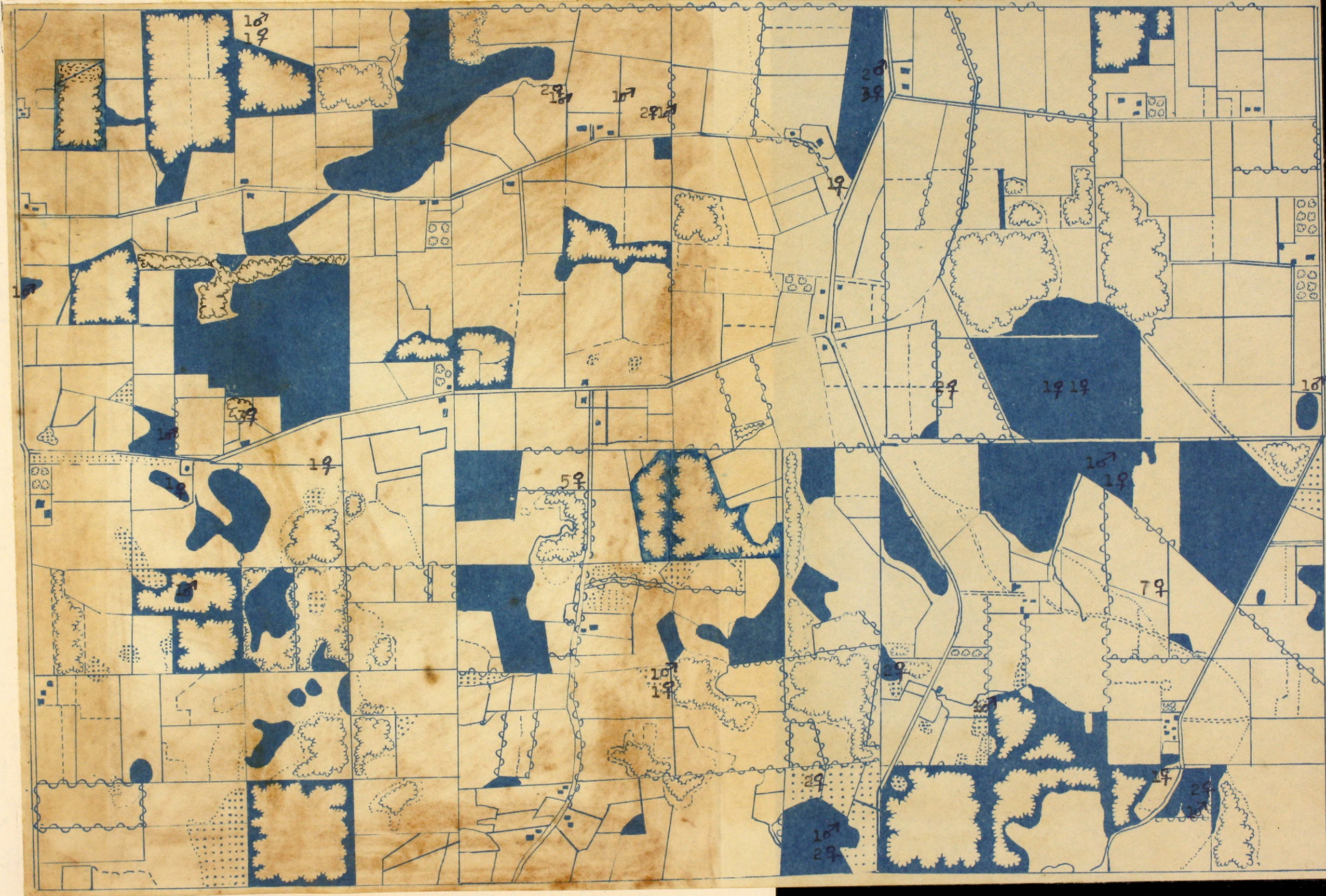
Section XXXIII, Scio Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)  
 Legend

♂ Male

♀ Female



CENSUS MAP



Sec. 1, 2, 3, 10, 11, 12, Sharon Township, Washtenaw County  
Scale 4" = 1 mile

3	2	1	Sec. Arrangement.	Legend	Male	Female
10	11	12				

per section. This gives an average of one breeding bird per 48 acres. Sex ratios varied from 0:3 to 1:5. The twelve sections contained 161 birds for a breeding population or a sex ratio of 1:2.7.

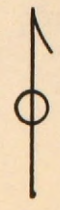
#### Evaluation of the Pheasant Range

Evaluating a pheasant range may seem more difficult or less difficult than first anticipated. After careful analysis of Wight's method of evaluating the pheasant range and its use in the field, the author is convinced of its values and the practicability of it. The method pictures the situation as found on the area, and the final results give a value which will summarize the conditions of the area.

A sample chart for rating the pheasant range on known areas, as constructed by Wight, is found on page 93 (basis for 1 square mile). Ten requirements are listed essential for a pheasant range, found in column one. Column two gives the number of units for one square mile. Column three gives the unit rating, on the basis of number, ten being the highest number. Since all units are not ideal they are given a size and quality rating of first, second, or third class. The fifth column or final value is obtained by dividing the unit rating by the size and quality rating. This method cares for the first six requirements. The remaining four requirements receive their final value by judging the value of each requirement from poor

RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township			Section
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)				
Winter food units (8)				
Crowing areas (40)				
Nesting sites (40)				
Rearing grounds (40)				
Sanctuary areas (4)				
Interspersion- - - - -				
Communication- - - - -				
Adaptation to management - - - - -				
General food and cover conditions- - - - -				
				Total
				Final rating
Rated by Fred Snell			Date	



PHEASANT VALUATION MAP



Section XXIV, Ann Arbor Township, Washtenaw County  
Scale 6" = 1 mile

(Insulation strip bordering section, 6.5 chains)

Legend

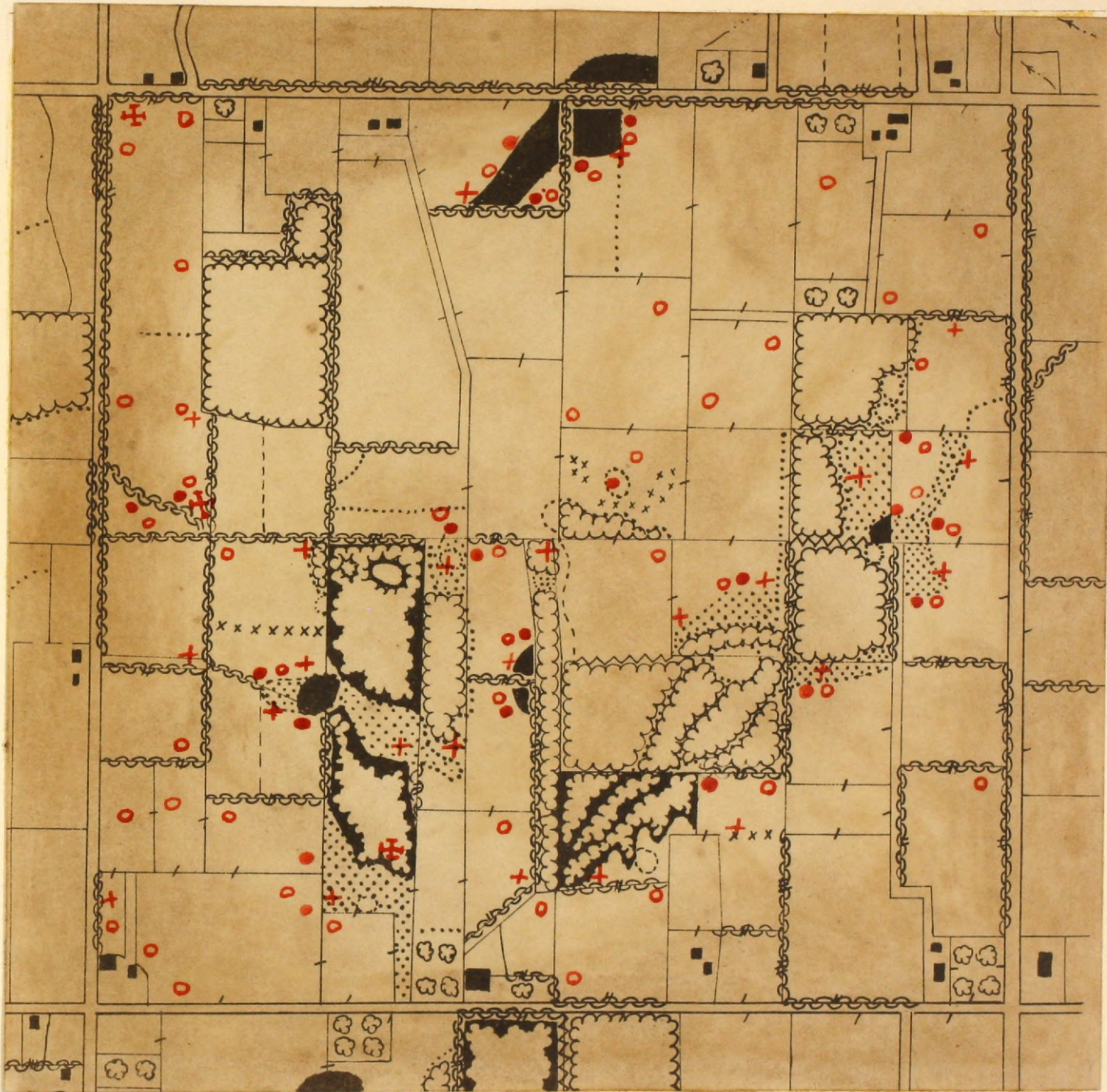
- Nesting Area

● Rearing Area
- ⊕ Crowing Area

⊕ Occupied Crowing Area



### PHEASANT VALUATION MAP



Section X, Lodi Township, Washtenaw County

Scale 6" = 1 mile

(Insulation strip bordering section, 6.5 chains)

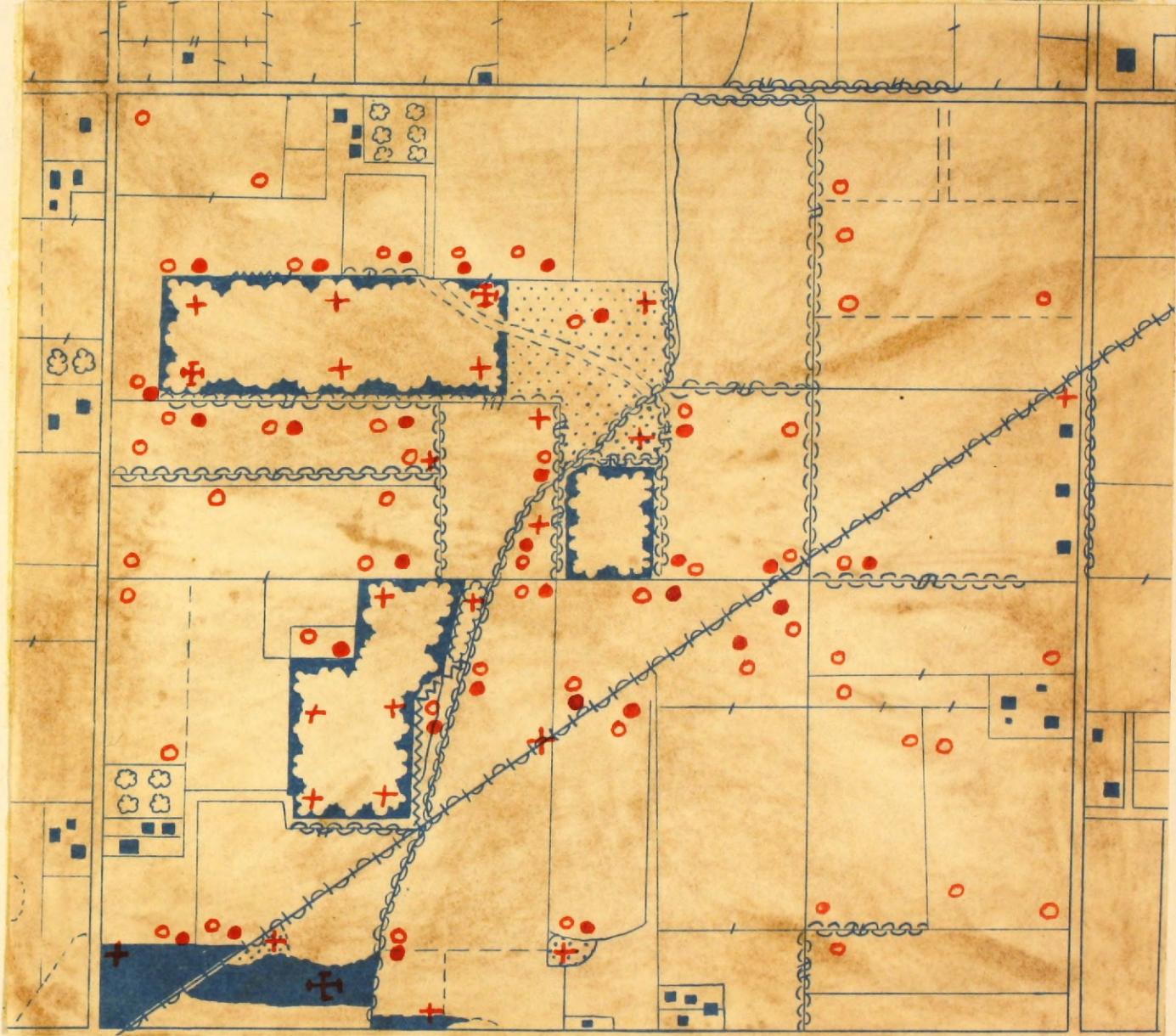
Legend

- Nesting Area
- Rearing Area

- + Crowing Area
- ⊕ Occupied Crowing Area



PHEASANT VALUATION MAP



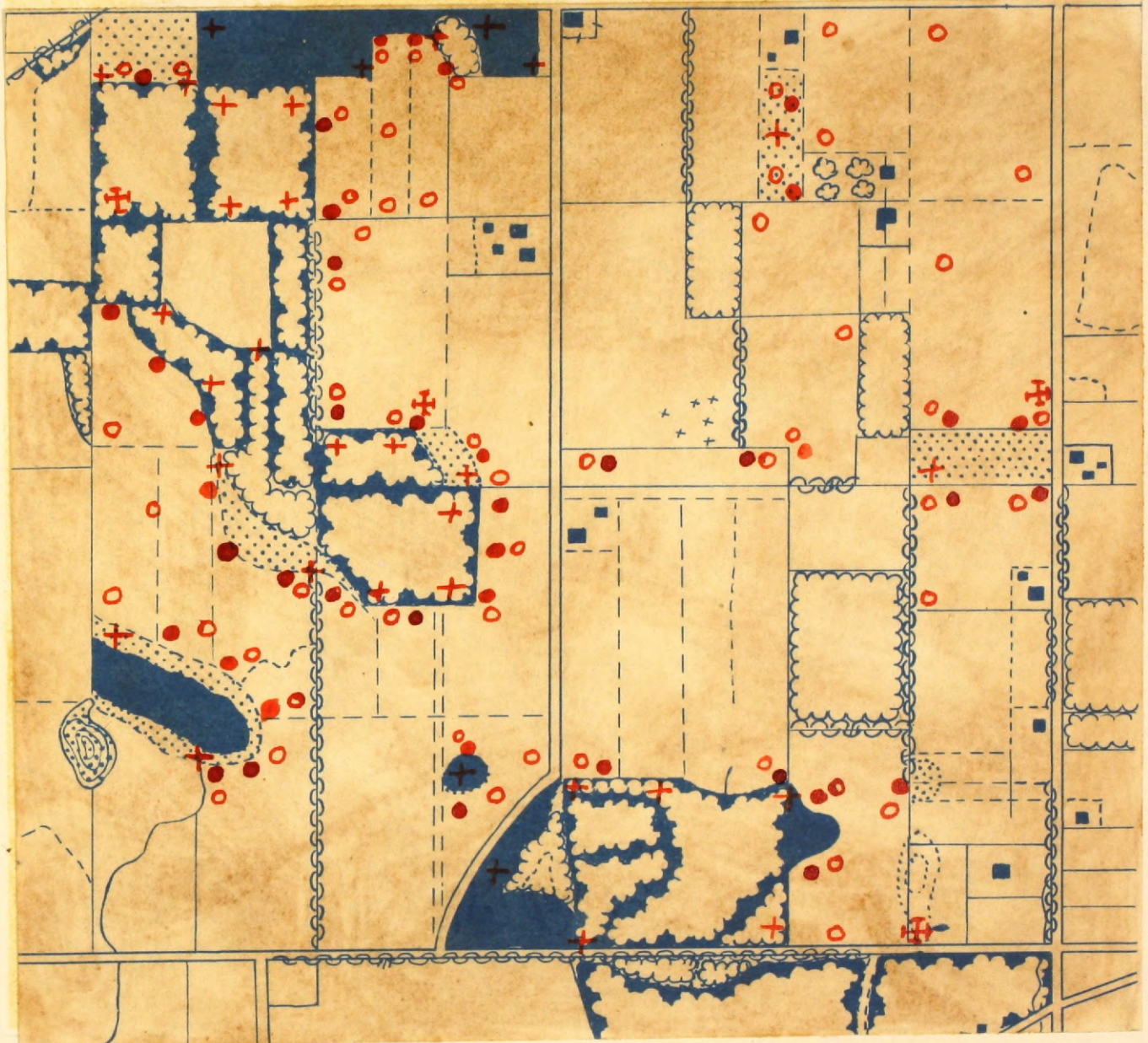
Section XV, Pittsfield Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)

Legend

- |   |              |   |                       |
|---|--------------|---|-----------------------|
| ○ | Nesting Area | + | Growing Area          |
| ● | Rearing Area | ⊕ | Occupied Growing Area |



## PHEASANT VALUATION MAP



Section XXII, Pittsfield Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)

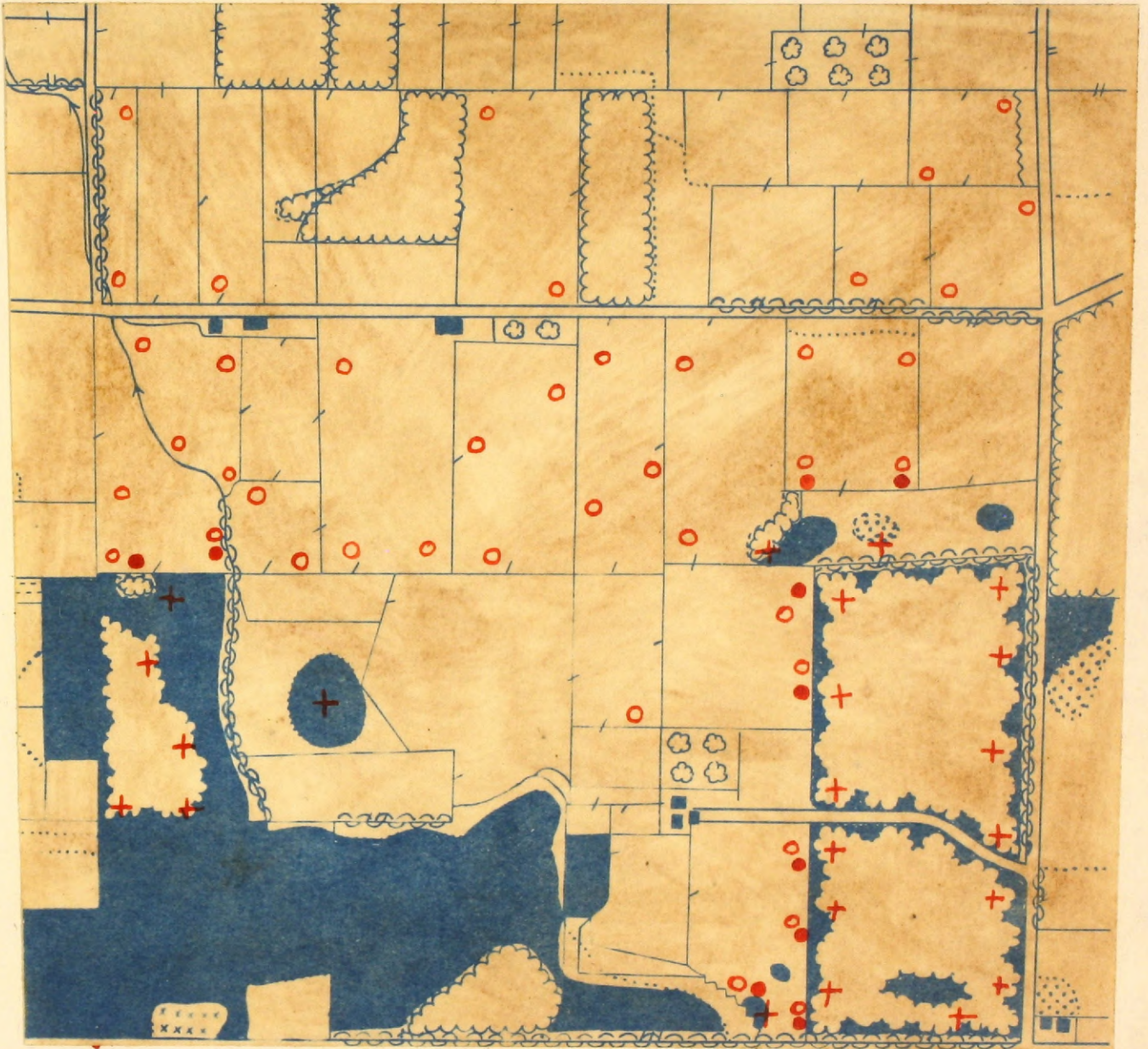
## Legend

- |                |                         |
|----------------|-------------------------|
| ○ Nesting Area | + Crowing Area          |
| ● Rearing Area | + Occupied Crowing Area |



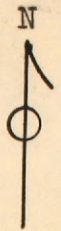


PHEASANT VALUATION MAP

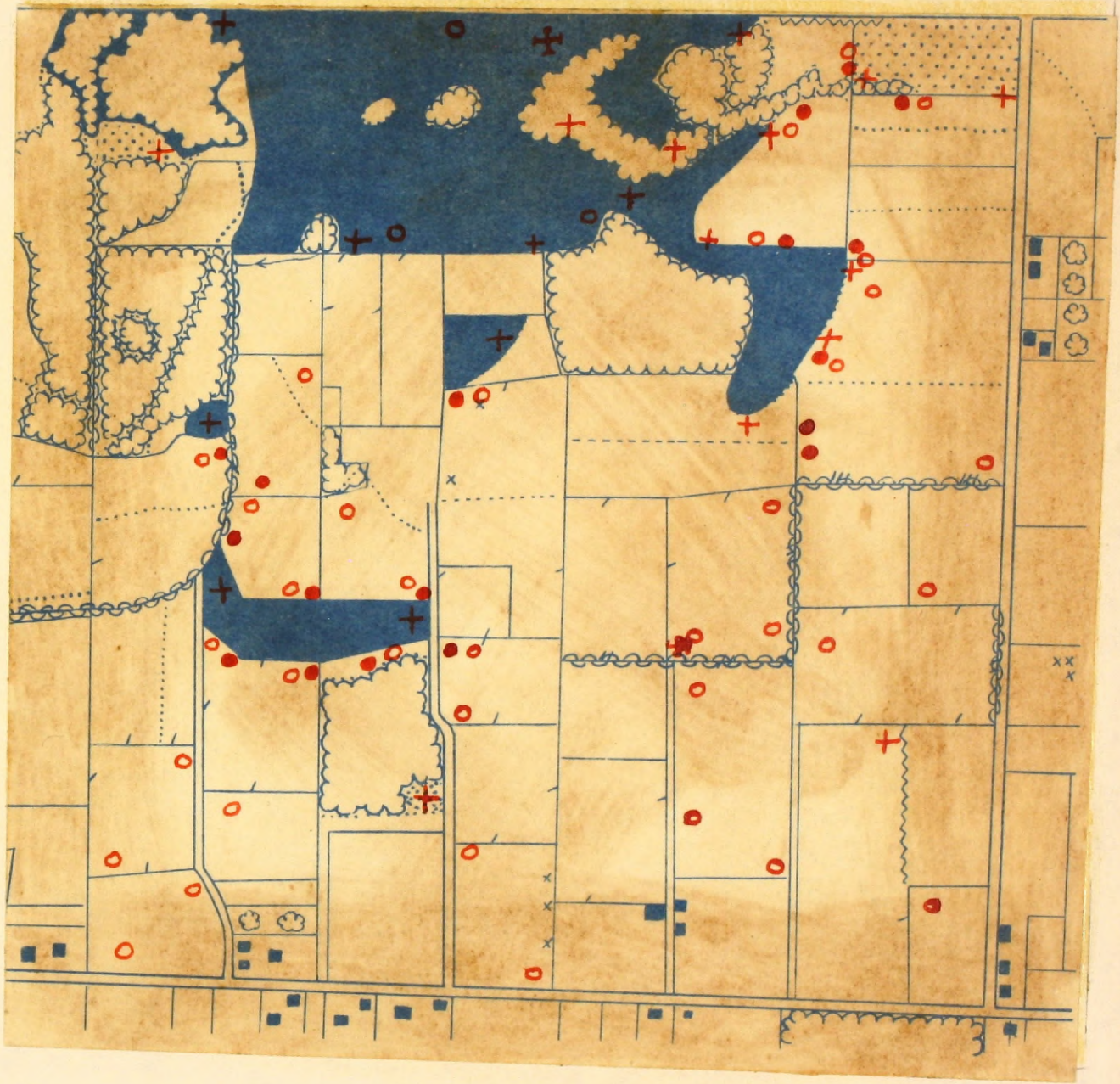


Section XXVIII, Scio Township, Washtenaw County  
Scale 6" = 1 mile  
(Insulation strip bordering section, 6.5 chains)

- Legend
- Nesting Area
  - Rearing Area
  - + Crowing Area
  - ⊕ Occupied Crowing Area



RHEASANT VALUATION MAP



Section XXXIII, Scio Township, Washtenaw County  
 Scale 6" = 1 mile  
 (Insulation strip bordering section, 6.5 chains)

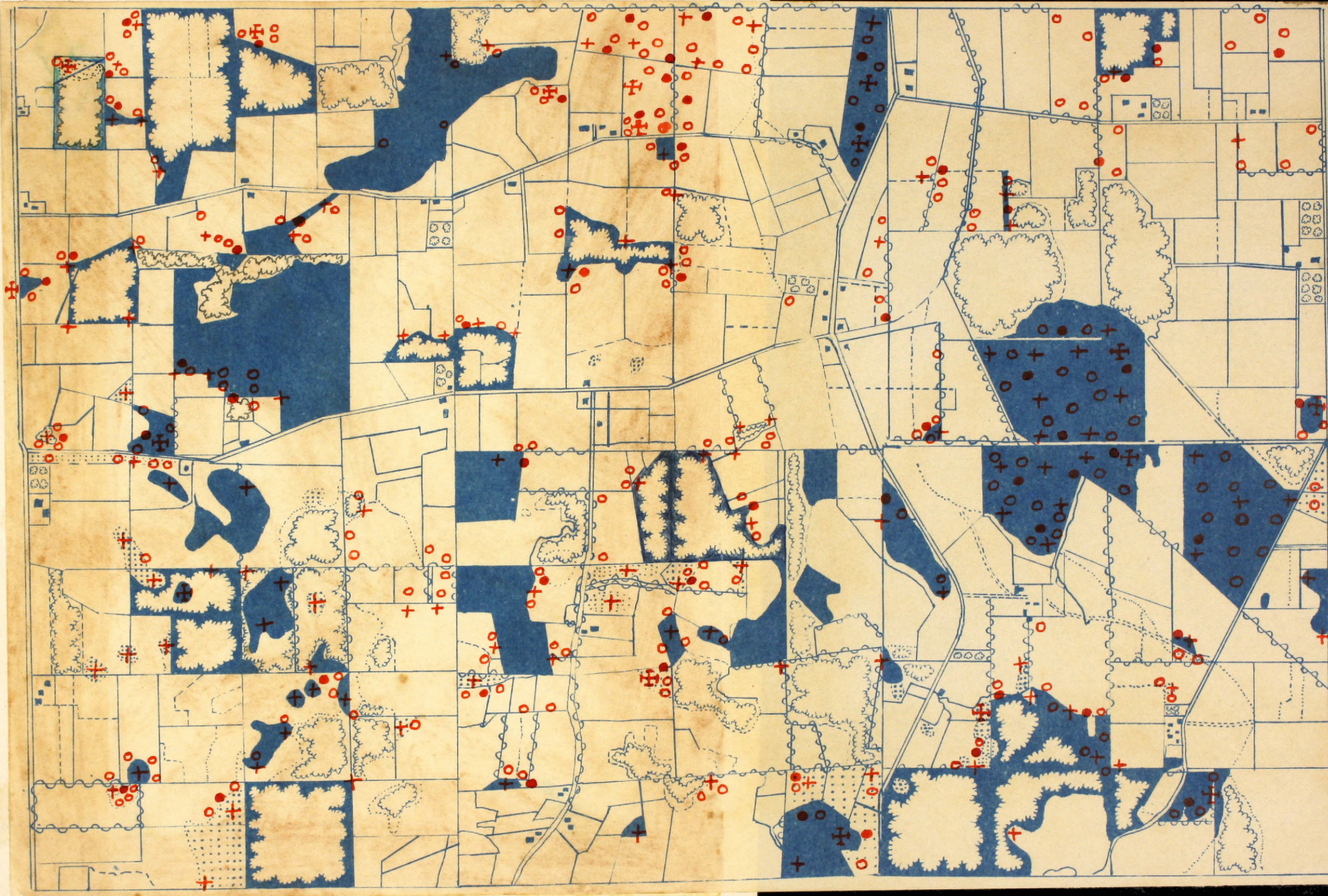
Legend

○ Nesting Area	+ Crowing Area
● Rearing Area	+ Occupied Crowing Area

PHEASANT VALUATION MAP



90



Sec. 1, 2, 3, 10, 11, 12, Sharon Township, Washtenaw County

3	2	1
10	11	12

Sec. Arrangement  
Legend

Scale 4" = 1 mile

Nesting Area  
Rearing Area

Crowing Area  
Occupied Crowing Area

to excellent and then substituting a numerical number from 1 to 10. The final values are then totaled, and the final rating is secured by finding which range the final value figure has fallen in.

The twelve sections were evaluated and may be found on page 92 to page 103. They ranked as follows:

Final Rating				
	I	II	III	IV
No. of Sections	1	5	5	1

The following table gives the spring population in relation to the final rating.

Area	Sec.	Final Rating	Total of Final Value	Spring Population
Ann Arbor	24	I	82.50	46
Sharon	11	II	60.42	12
Sharon	12	II	58.75	16
Sharon	2	II	53.25	13
Lodi	10	II	51.80	11
Pittsfield	22	II	51.80	22
Pittsfield	15	III	49.65	15
Scio	33	III	47.10	11
Sharon	3	III	49.00	7
Sharon	10	III	44.75	3
Sharon	1	III	38.15	5
Scio	28	IV	23.70	0

Some relationship will be noted between a breeding population and the final value of evaluation of a pheasant range. The higher populations appear in the higher rated sections, thus showing that the range evaluation plan will give a good picture of the area for a pheasant range.

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Ann Arbor		Section 24	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	4	10	1	10.0
Winter food units (8)	8	10	1	10.0
Crowing areas (40)	40	10	1	10.0
Nesting sites (40)	50	10	1	10.0
Rearing grounds (40)	34	8.25	1.5	5.5
Sanctuary areas (4)	4	10	1	10.0
Interspersion- - - - -				8.0
Communication- - - - -				5.0
Adaptation to management - - - - -				5.0
General food and cover conditions- - - - -				8.0
			Total	82.5
			Final rating	I
Rated by Fred Snell			Date	

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Lodi		Section 10	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	2	5	3	1.7
Winter food units (8)	6	7.5	1	7.5
Crowing areas (40)	25	6.25	1.5	4.2
Nesting sites (40)	48	10	2	5.0
Rearing grounds (40)	22	5.5	1.5	3.7
Sanctuary areas (4)	2	5	3	1.7
Interspersion- - - - -				8.0
Communication- - - - -				8.0
Adaptation to management - - - - -				7.0
General food and cover conditions- - - - -				5.0
			Total	51.8
			Final rating	II
Rated by Fred Snell			Date	

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Pittsfield		Section 15	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	3	7.5	2	3.75
Winter food units (8)	2	2.5	3	0.8
Crowing areas (40)	27	6.75	1.5	4.6
Nesting sites (40)	50	10	2	5.0
Rearing grounds (40)	30	7.5	1.5	5.0
Sanctuary areas (4)	2	5	2	2.5
Interspersion- - - - -				6.0
Communication- - - - -				8.0
Adaptation to management - - - - -				7.0
General food and cover conditions- - - - -				7.0
Total				49.65
Final rating				III
Rated by Fred Snell			Date	

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Pittsfield		Section 22	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	4	10	1	10
Winter food units (8)	7	8.75	1.5	5.4
Crowing areas (40)	40	10	1	10
Nesting sites (40)	55	10	1.5	6.7
Rearing grounds (40)	42	10	1.2	8.0
Sanctuary areas (4)	4	10	1.5	6.7
Interspersion- - - - -				6.0
Communication- - - - -				4.0
Adaptation to management - - - - -				6.0
General food and cover conditions- - - - -				7.0
			Total	51.8
			Final rating	II
Rated by Fred Snell			Date	



## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Scio			Section 28
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	2	5	3	1.7
Winter food units (8)	1	1	3	0.3
Crowing areas (40)	22	5.5	2	2.8
Nesting sites (40)	45	10	2	5.0
Rearing grounds (40)	11	2.75	2	1.4
Sanctuary areas (4)	2	5	2	2.5
Interspersion- - - - -				4.0
Communication- - - - -				1.0
Adaptation to management - - - - -				2.0
General food and cover conditions- - - - -				3.0
Total				23.7
Final rating				IV
Rated by Fred Snell			Date	

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Scio		Section 33	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	4	10	1.7	7.0
Winter food units (8)	4	5	1.5	3.3
Crowing areas (40)	22	5.5	2.0	2.8
Nesting sites (40)	40	10	2.0	5.0
Rearing grounds (40)	16	4	2.0	2.0
Sanctuary areas (4)	3	7.5	1.5	5.0
Interspersion- - - - -				4.0
Communication- - - - -				3.0
Adaptation to management - - - - -				5.0
General food and cover conditions- - - - -				5.0
			Total	47.1
			Final rating	III
Rated by Fred Snell			Date	

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Sharon		Section 1	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	3	7.5	2	3.75
Winter food units (8)	2	2.5	1	2.5
Crowing areas (40)	14	3.5	1	3.5
Nesting sites (40)	39	9.75	2	4.9
Rearing grounds (40)	14	3.5	1	3.5
Sanctuary areas (4)	2	5	1	5
Interspersion- - - - -				5
Communication- - - - -				3
Adaptation to management - - - - -				3
General food and cover conditions- - - - -				5
			Total	38.15
			Final rating	III
Rated by Fred Snell			Date	

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Sharon		Section 2	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	4	10	2	5
Winter food units (8)	1	2.5	1	2.5
Crowing areas (40)	25	6.25	1	6.25
Nesting sites (40)	40	10	1	10
Rearing grounds (40)	16	4	1	4
Sanctuary areas (4)	3	7.5	1	7.5
Interspersion- - - - -				4
Communication- - - - -				2
Adaptation to management - - - - -				7
General food and cover conditions- - - - -				5
			Total	53.25
			Final rating	II
Rated by Fred Snell			Date	

RATING SHEET FOR PHEASANT RANGE

County Washtenaw		Township Sharon		Section 3	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10	
Winter roosting sites (4)	4	10	1	10	
Winter food units (8)	2	2.5	1	2.5	
Crowing areas (40)	23	5.75	1	5.75	
Nesting sites (40)	34	8.5	2	4.25	
Rearing grounds (40)	11	2.75	1	2.75	
Sanctuary areas (4)	3	7.5	2	3.75	
Interspersion- - - - -				7	
Communication- - - - -				2	
Adaptation to management - - - - -				7	
General food and cover conditions- - - - -				4	
Total				49.00	
Final rating				III	
Rated by Fred Snell			Date		

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Sharon			Section 10
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	3	7.5	1	7.5
Winter food units (8)	0	0	0	0.0
Crowing areas (40)	32	8	2	4.0
Nesting sites (40)	25	6.25	1	6.25
Rearing grounds (40)	6	1.5	1	1.50
Sanctuary areas (4)	2	5	2	2.50
Interspersion- - - - -				8
Communication- - - - -				3
Adaptation to management - - - - -				8
General food and cover conditions- - - - -				4
			Total	44.75
			Final rating	III
Rated by Fred Snell			Date	

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Sharon		Section 11	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	3	7.5	1	7.5
Winter food units (8)	1	1.25	3	.42
Crowing areas (40)	24	6.00	1	6.0
Nesting sites (40)	36	9.0	1	9.0
Rearing grounds (40)	9	2.25	1	2.25
Sanctuary areas (4)	1	2.5	2	1.25
Interspersion- - - - -				9
Communication- - - - -				8
Adaptation to management - - - - -				8
General food and cover conditions- - - - -				5
			Total	60.42
			Final rating	II
Rated by Fred Snell			Date	

## RATING SHEET FOR PHEASANT RANGE

County Washtenaw	Township Sharon		Section 12	
Requirements	Tally of Number of Units	Unit Rating up to 10	Size and Quality Rating 1 to 3	Final Value 0-10
Winter roosting sites (4)	4	10	1	10
Winter food units (8)	3	3.75	1	3.75
Crowing areas (40)	27	6.75	1	6.75
Nesting sites (40)	40	10	1	10
Rearing grounds (40)	11	2.75	1	2.75
Sanctuary areas (4)	1	2.5	1	2.5
Interspersion- - - - -				6
Communication- - - - -				9
Adaptation to management - - - - -				10
General food and cover conditions- - - - -				7
			Total	58.75
			Final rating	II
Rated by Fred Snell			Date	



### Use of Natural Features

Natural features are referred to here as all places furnishing natural and permanent cover; such as woodlots, marshes, kettleholes, bogs, fence rows and abandoned land.

The covers of these areas are considered pivot covers for the pheasant and their use is discussed. Woodlots in percent of land cover by section ranges from 8.5% to 23.6%, with an average of 16.8% per section. Some of these woodlands have been too heavily grazed or cut over, and they are of little value to pheasants. Of this 16.8% of the land cover, only 8.5% is considered valuable to the pheasant in the way of cover. On some sections the non-cover timber runs higher, while on other sections the reverse is true.

Eight and five-tenths percent or fifty acres of cover in the form of woodlots is important to the pheasant. Woodlots are used for winter roosting cover, escape cover, crowing areas, sanctuary areas, portions of the rearing areas, and possibly nesting and winter food areas in some cases. Wight, 1935, rates an ungrazed, ten acre woodlot, as four crowing areas for the pheasant.

Marshes are an important factor in making up the landscape of southern Michigan. On the areas studied, the marshes ranged from 1.8% to 32.8% or an average of 13.1%, or eighty-four acres per section. This represents an enormous picture

to the pheasant in its life role.

Although many of the marshes are pastured to some degree, most of them serve in some capacity in the pheasant's life role. Marsh cover serves its duty by giving winter and spring cover and escape cover to the pheasant during the period of the year when most all other cover besides woodlot cover is nil. Besides marshes being used for winter roosting sites and escape cover they serve as crowing areas, nesting areas, rearing grounds, sanctuary areas, communication, and food units in some instances.

Since kettleholes contain cover similar to marshes, while many of them contain brush, they serve the pheasant in the manner of crowing areas, escape cover, nesting sites, rearing grounds and food units.

Many of the fence rows in Southern Michigan are absent of cover. While many are, those that do contain fair cover, serve the pheasant in the manner of travel lanes. Table , page , will give the length of travel lanes on the areas studied. The length of travel lanes is important, but still more important is their location on the area and the other covers they connect, because if they do not connect areas of cover with food patches and other cover areas, their value is almost nil, except for escape cover.

#### Role of Each Cultivated Crop

Cultivated crops play their role mainly in food, next in nesting sites, and then cover. They are used extensively as

cover. Cultivated crops, according to Dalke, 1934, pp. 23 and 24, constituted from 36% to 95% of the pheasant's diet by the month. The average for the entire year was 74% of its entire diet. According to Dalke, 1934, Table V, p. 25, the cultivated crop ranked in importance in the pheasant's diet as such.

Species	% of Year's Diet	% of Total Grain Eaten
Corn	33	45
Wheat	20	27
Barley	8	11
Beans	5	7
Oats	5	6
Buckwheat	3	4
Total	74	100

Dalke, 1934, also found that on 1,181 samples taken in grainfields the following amounts of waste grain were found per section: corn 124.3 bushels; wheat, 74 bu.; oats, 11.5 bu.; barley, 3.2 bu.; and beans, 2.0 bu.

Weed seeds ranked second in importance in the pheasant's diet. Weed seed production is effected considerably by cropping practices and rotations. Methods of cultivation and mowing practices in stubble greatly effect the supply of wild weed seed. The common practice of clipping stubble fields greatly reduces the amounts of food and cover. Dalke, 1934, found the amounts of wild weed seed per section to be: foxtail, 4.0 bushel, smartweed; 1.7 bu.; and sedge 23.7 bu.

As stated before, the large percentage of haying crop enter strikingly into the pheasant nesting habits, and the times of cutting still present a more striking picture, due to the number of nest destructions or failures.

Interpretation of Each Section, Crop vs. Pheasant Populations

Some correlation may exist between the percentages of corn and small grain crops and the pheasant population after considering other effecting factors. Using the spring pheasant population, the following comparison between it and the average of a five year crop acreage are:

Township	Sec. No.	% of Land in Crops (5 yr.Av.)		Spring Pheasant Census
		Corn	Small grains, Wheat, Oats, Rye, Barley	
Ann Arbor	24	6.7	10.8	46
Lodi	10	14.0	19.5	11
Pittsfield	15	16.2	25.9	15
Pittsfield	22	13.0	18.2	22
Scio	28	12.9	16.9	0
Scio	33	13.5	17.3	11
Sharon	1	16.4	17.9	5
Sharon	2	12.5	23.1	13
Sharon	3	10.0	17.0	7
Sharon	10	3.5	4.3	3
Sharon	11	8.5	8.7	12
Sharon	12	11.2	10.0	16

It is true that pheasant populations are affected by the amount of corn and method of harvesting on the section, but so many other factors enter in the picture and effect a

correlation if there is one. Winter feeding and amount and condition of winter cover enters in the above picture.

Ann Arbor, 24, had an average of 6.7% of its entire land in corn for a 5 yr. average. Its spring pheasant population was 46, the highest by far of any of the twelve sections. Small grain percentage was 10.8%. This amount of corn has its effects. This section cannot be considered normal and should not be allowed to color the picture of normal sections, since the east side of the section is an ideal marsh sanctuary of 110 acres, plus an additional couple hundred acres in the adjoining section. These birds were not molested throughout their winter stay on the area, and over 150 bu. of corn were fed them. Undoubtedly few birds left the area after arriving. This accounts for a large breeding population on Ann Arbor 24.

Sharon 10 has only 3.5 percent of its land area in corn, and 4.3 percent in small grains. The spring population is 3 birds. Food is the limiting factor on this section, but the nature of the section prevents a big increase in cultivated crops.

Scio 28, is a problem within itself. Corn percentage is sufficient, but the reason for a low population is because of lack of cover on the area. The marsh on the southern end of the section is pastured heavily and it was also burned over the spring of 1941. There are no travel lanes connecting with what permanent cover that does exist.

Sharon 1, has a high percentage of corn. Outside of the marsh at the southern end of the section, cover is poor and in small patches with no travel lanes.

The author has found that outside of Ann Arbor 24, two sections, Scio 28, and Sharon 1, have the limiting factor as a lack of cover, Sharon 3 is the finest example of a section which has its limiting factor, food.

The remaining sections contain sufficient percentages of rotated crops, but the limiting factors are cropping practices, lack of travel lanes, and possible arrangement of fields to present existing cover. The remaining sections present the most common picture in Southern Michigan by average pheasant populations, average agricultural practices, and field arrangements.

#### Recommendations for Adjustments

##### Present Unsatisfactory Practices on the Areas

Present unsatisfactory practices do not include present crop rotations. These practices are: the cropping practices, pasturing practices, field arrangement, and elimination of travel lanes.

Many cropping practices on the farm do not benefit the pheasant, but rather harm him. Most of the present practices fit into present farm plans, and if these practices were changed, farm plans would have to be altered. The method of

corn harvesting should be changed to benefit the pheasant more.

Pasturing practices should be altered greatly to effect the pheasant. Many alterations in the present pasturing practices would be sound economical farm practices.

Many of the present fence rows are kept clean. Clean farming has been advocated for years by our land grant colleges. This has had a serious effect upon our present pheasant population.

Present field arrangements are not ideal for an excellent pheasant preserve. As many fields as possible should be arranged so a portion of the field lies adjacent to pivot cover then, and those that cannot should have travel lanes connecting them.

Since alfalfa is an ideal forage crop and favorite nesting place for the pheasant, it should not be decreased in acreage due to the number of nesting failures in that type. Good hay cutting practices should be introduced to eliminate as many nesting failures as possible.

#### Present Good Policies on the Areas

Policies found to be good are the present crop rotations and crop percentages. These two factors work hand in hand, because when a rotation is followed quite closely the crop percentages will remain rather constant. A six year rotation is a popular rotation for general livestock and field crop farming.

### Ideal Policies to Follow

Present practice of cutting large acreages of corn for fodder should be cut to a minimum, and hay fed more extensively. These fields of corn that could be left to be shucked off the stock by hand would greatly add to the pheasant's winter cover and food. The standing stocks would also provide protection to the herbaceous plants.

Haying practices should be altered. Especially in alfalfa, flushing bars should be used entirely. All possible trouble should be taken to locate nests and then leave sufficient standing hay to properly conceal and protect the nest.

The grazing of marshes should be cut to a minimum in number, and those grazed should be cut to a minimum of grazing. Also the grazing of woodlots should be eliminated both from the standpoint of timber production and cover for wildlife. This would greatly add to the amount of pivot cover.

The clearing and burning of fence rows should be eliminated. All fence rows should be allowed to grow wild and also be encouraged to do so. This will greatly aid the pivot cover by providing travel lanes for birds and connect all pivot cover and food areas.

### Ideal Field Arrangements

The factor the author has under control for recommendations in this study is one of field arrangement.

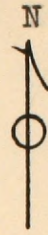


Since Ann Arbor 24, Lodi 10, Scio 28, Scio 33, Pittsfield 15, and Pittsfield 22 are quite level in topography, the author has considered these six sections to show how field arrangements can be made to aid the pheasant on level terrain. Pages 113 to 118. Each farm was considered an independent enterprise in the arrangement. The pivot cover of all the entire section and surrounding sections were used as a unit, to tie all fields to them.

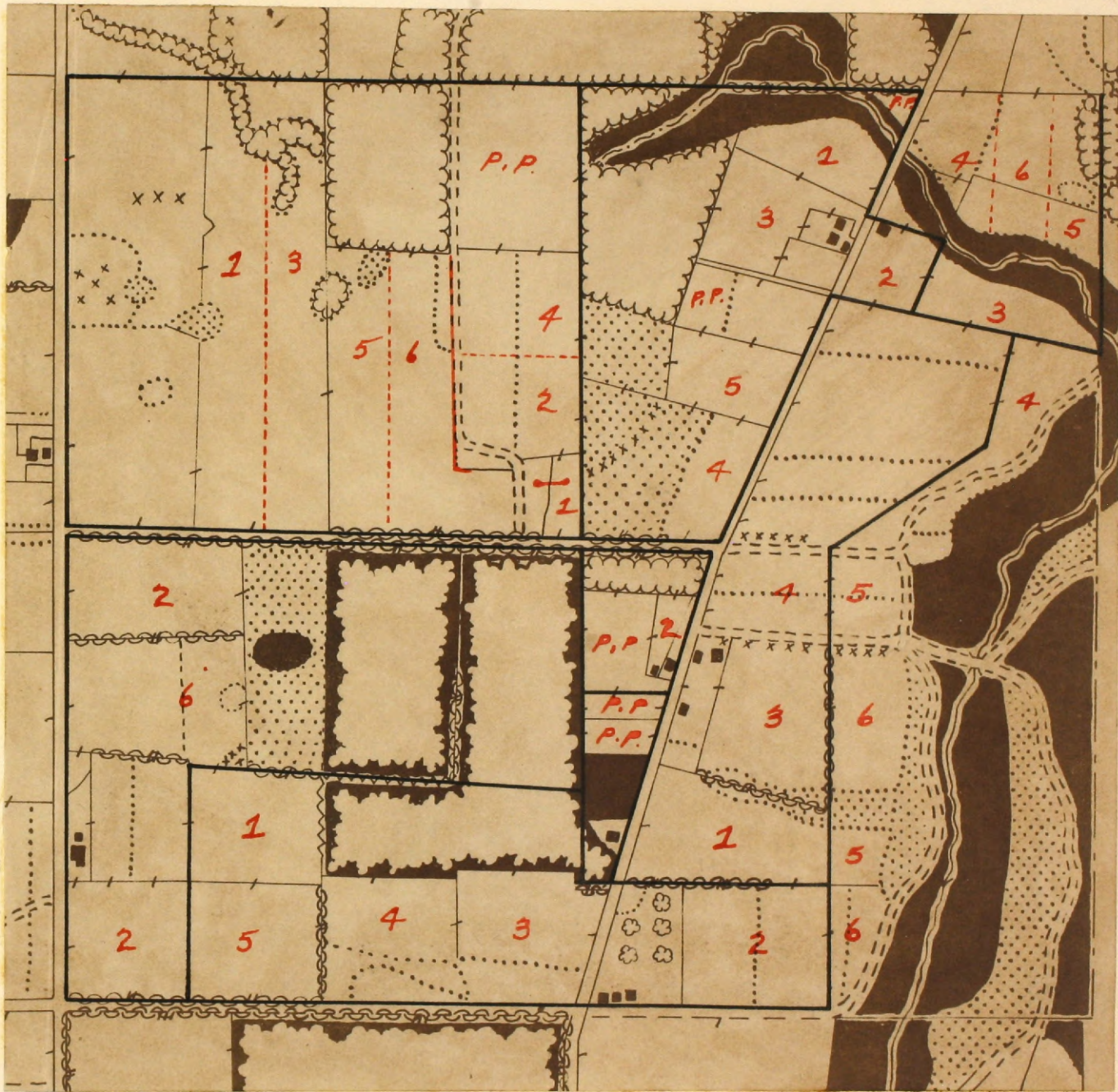
Sharon 1, 2, 3, 10, 11, 12 contained more rolling terrain; so they were used to show the effect of contour stripping upon the pheasant population. Page 119. Each farm was considered a separate enterprise here also, but contours were followed to show the result of crop connections to permanent cover.

Besides these six sections having more contacts to pivot cover, the strips in themselves provide travel lanes to food areas. This was not taken into consideration in determining the increased percentages of additional corn food areas adjacent to pivot cover.

Table XVI, page 120 shows the percentages of corn and the number of corn units adjacent to pivot cover by years before and after recommendations. It will be found that the percentage of increase of number of corn units adjacent to pivot cover after recommendations varies from 26% to 242%. It



## NEW FIELD ARRANGEMENT MAP

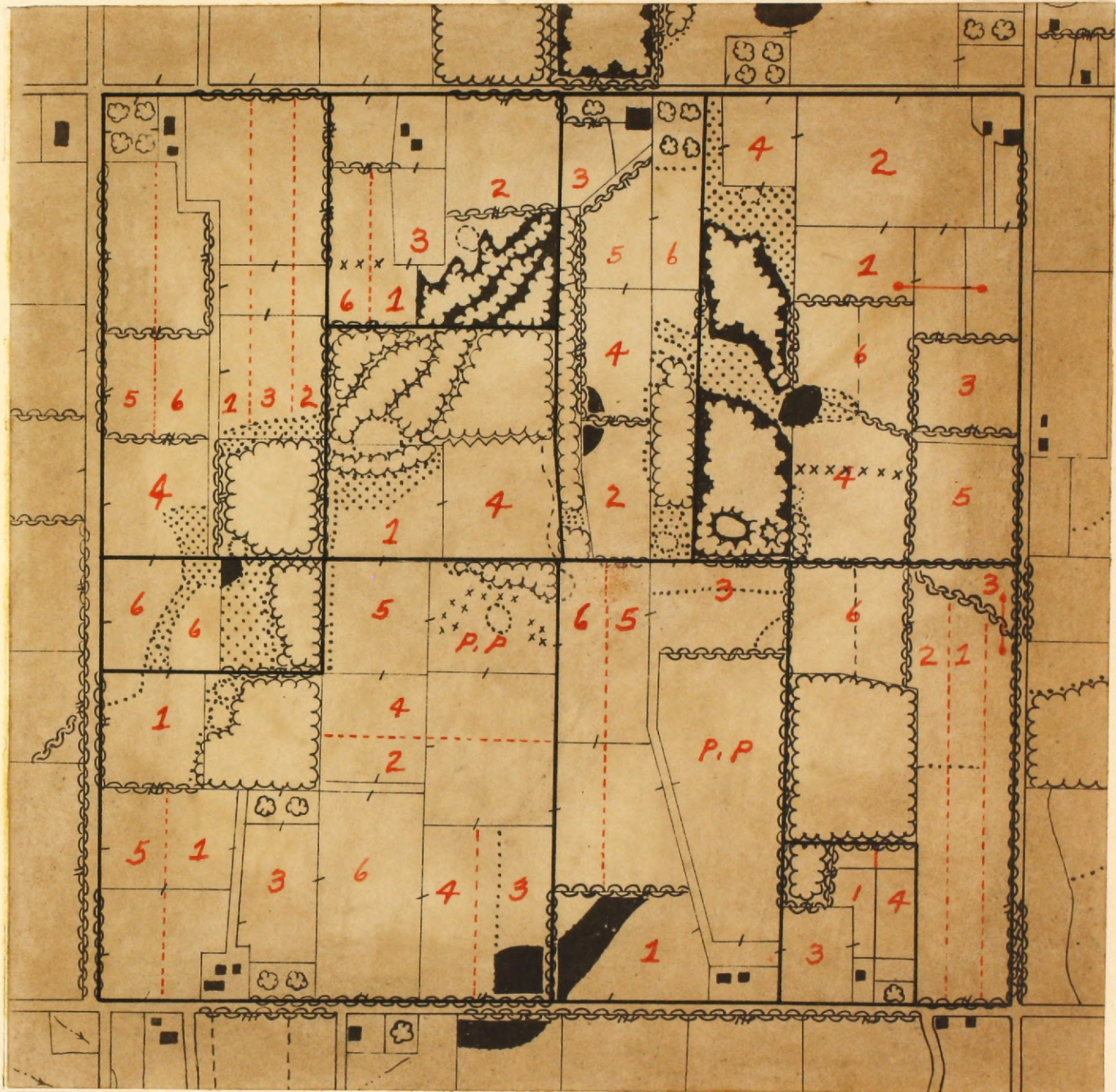


Section XXIV, Ann Arbor Township, Washtenaw County  
Scale 6" = 1 mile

## Legend

- Property line    P. P. - Permanent Pasture    - - - - - New Field Line  
All fields carry 6 yr. rotations. No. indicates yr. corn  
appears in rotation  
(Insulation strip bordering section, 6.5 chains)

NEW FIELD ARRANGEMENT MAP



Section X, Lodi Township, Washtenaw County

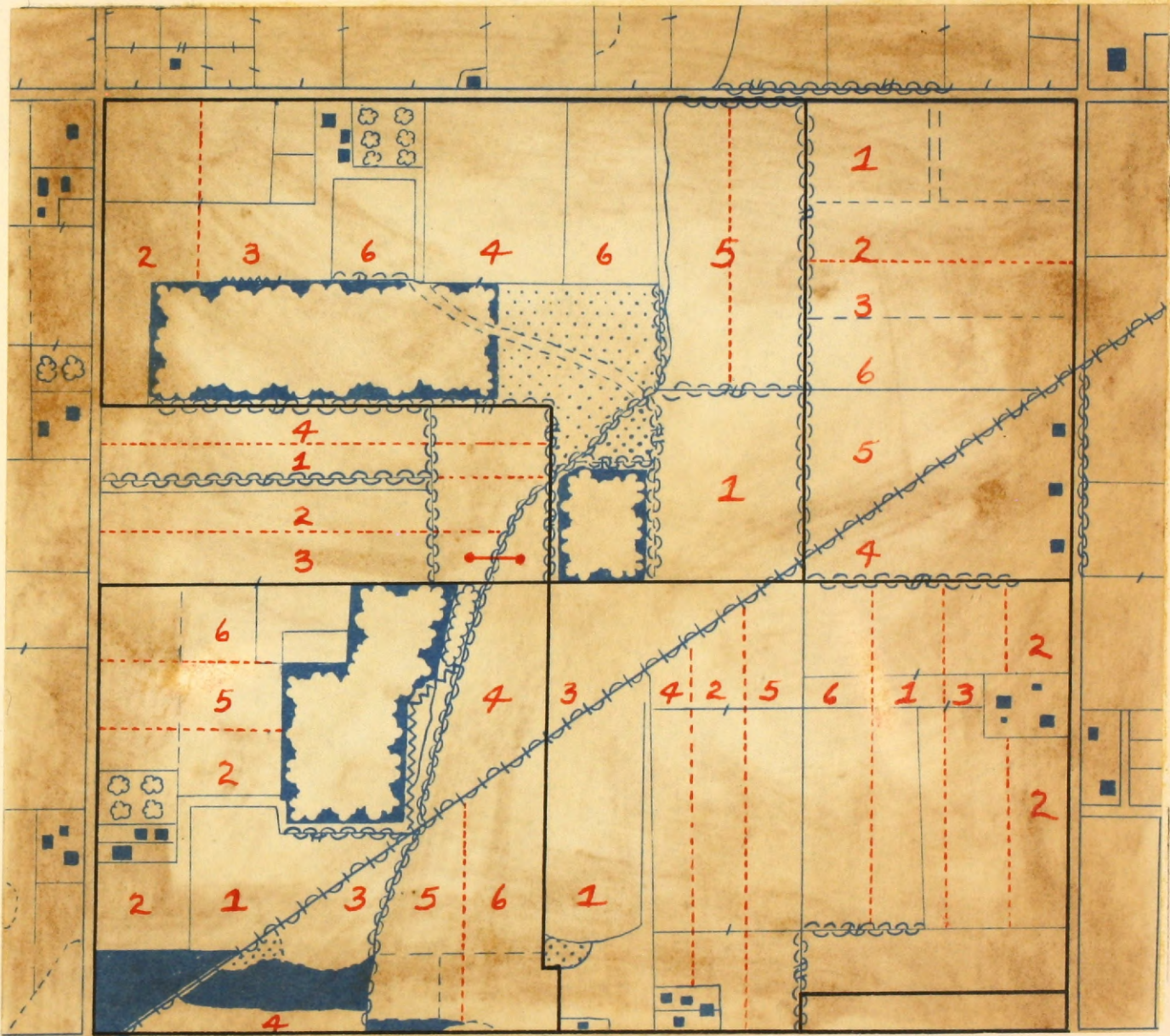
Scale 6" = 1 mile

Legend

— Property line P.P.—Permanent Pasture - - - - - New Field Line  
 All fields carry 6 yr. rotations. No. indicates yr.  
 corn appears in rotation  
 (Insulation strip bordering section, 6.5 chains)



NEW FIELD ARRANGEMENT MAP

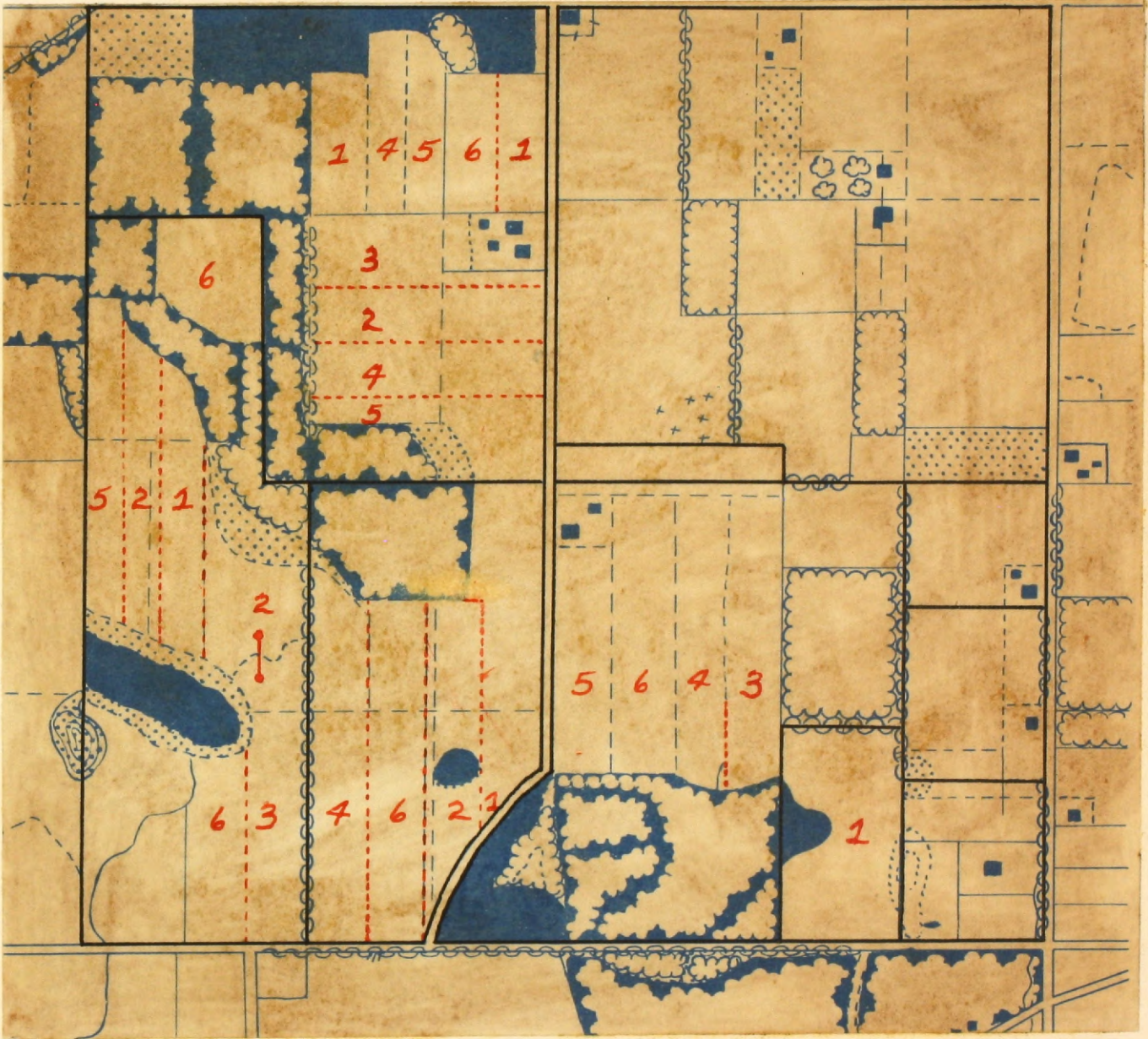


Section XV, Pittsfield Township, Washtenaw County  
 Scale 6" = 1 mile

— Property line P.P.—Permanent Pasture - - - - New Field Line  
 All fields carry 6 yr. rotations. No. indicates yr.  
 corn appears in rotation  
 (Insulation strip bordering section, 6.5 chains)



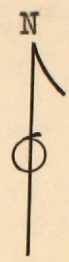
NEW FIELD ARRANGEMENT MAP



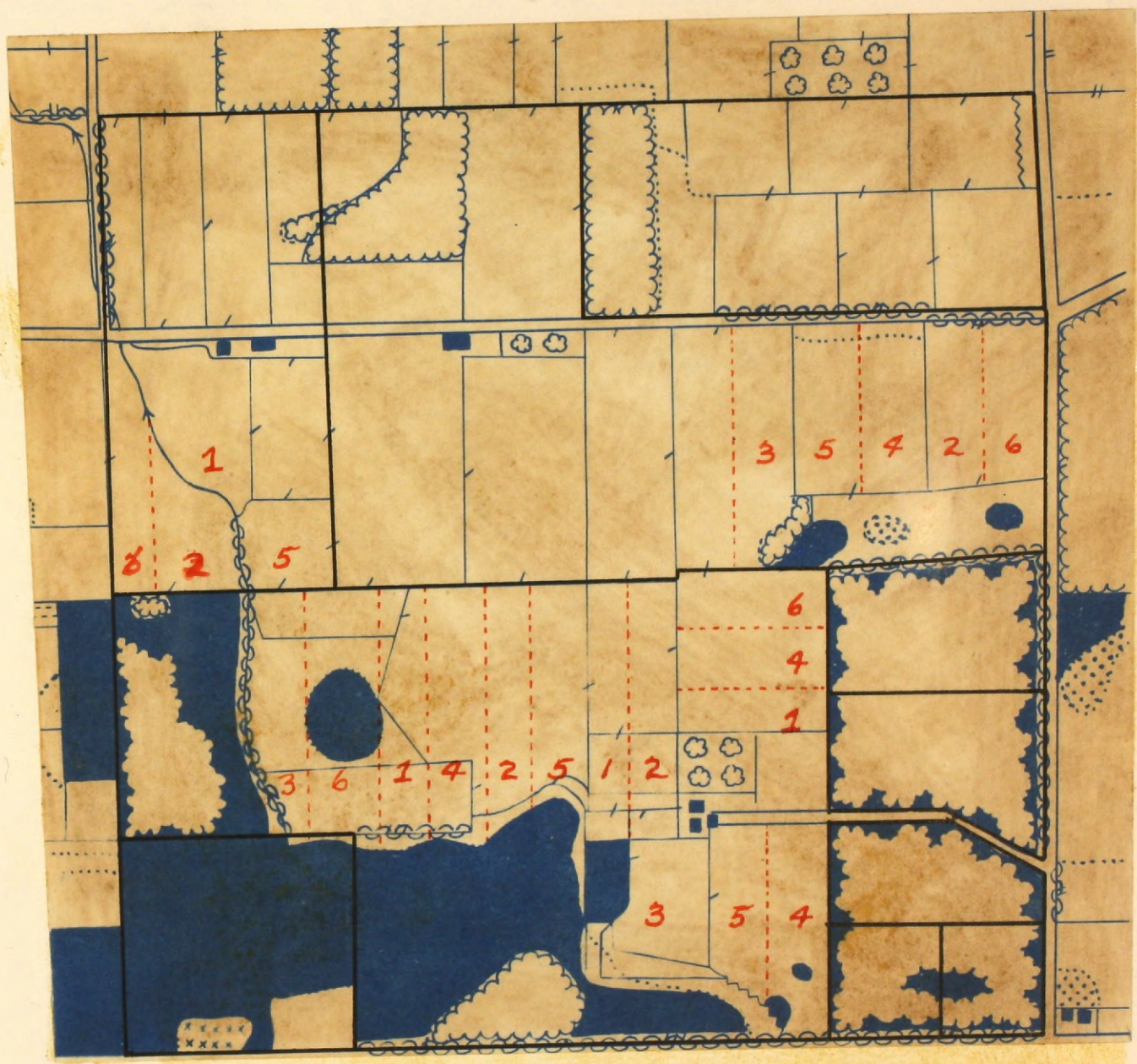
Section XXII, Pittsfield Township, Washtenaw County  
 Scale 6" = 1 mile

— Property line P.P.-Permanent Pasture - - - - - New Field Line  
 All fields carry 6 yr. rotations. No. indicates yr.  
 corn appears in rotation

(Insulation strip bordering section, 6.5 chains)



### NEW FIELD ARRANGEMENT MAP



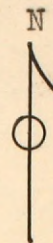
Section XXVIII, Scio Township, Washtenaw County

Scale 6" = 1 mile

— Property line P.P.-Permanent Pasture - - - - - New Field Line

All fields carry 6 yr. rotations. No. indicates yr. corn appears in rotation

(Insulation strip bordering section, 6.5 chains)



NEW FIELD ARRANGEMENT MAP



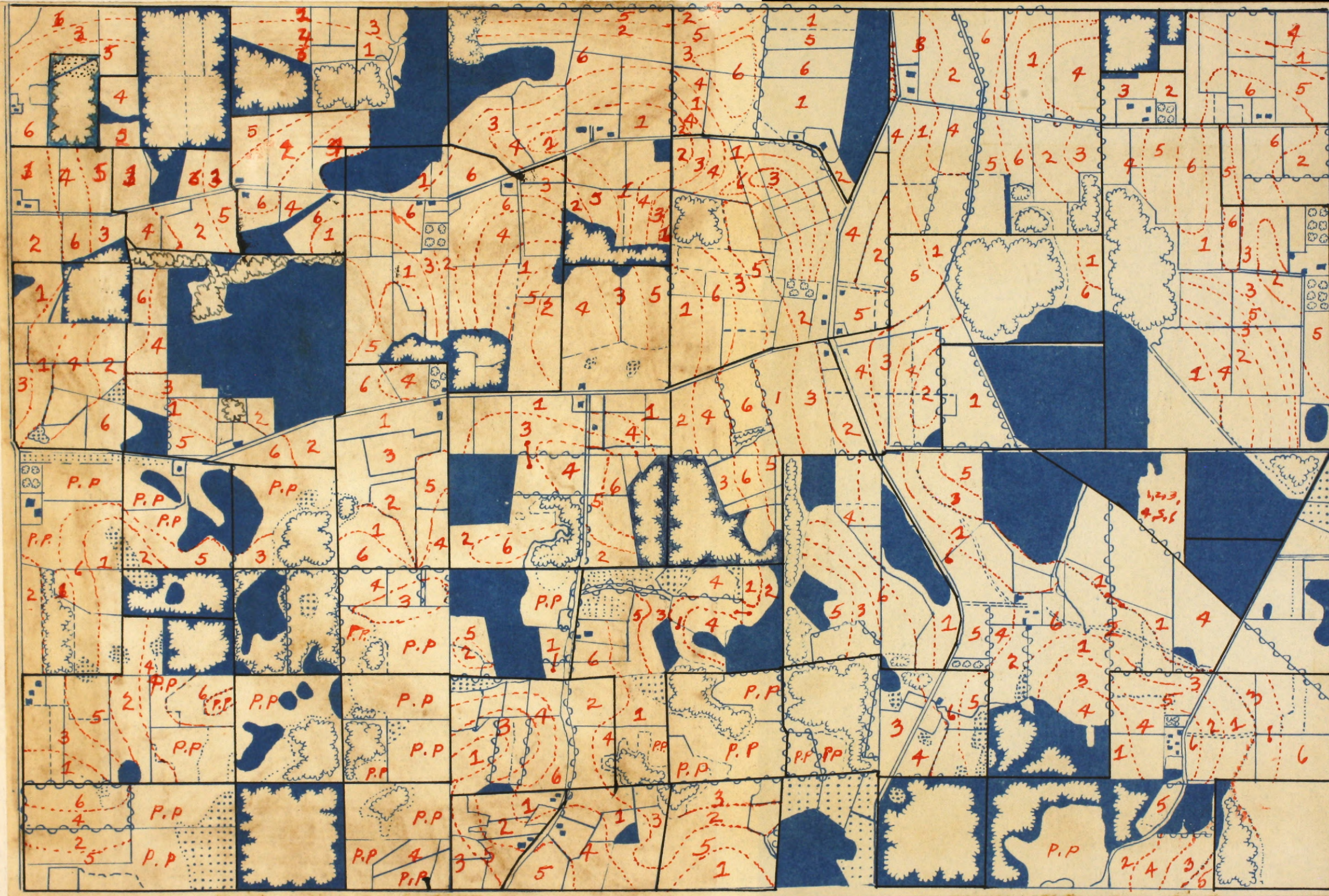
Section XXXIII, Scio Township, Washtenaw County

Scale 6" = 1 mile

— Property line P.P.-Permanent Pasture - - - - New Field Line  
 All fields carry 6 yr. rotations. No. indicates yr.  
 corn appears in rotation  
 (Insulation strip bordering section, 6.5 chains)



NEW FIELD ARRANGEMENT MAP



Sec. 1, 2, 3, 10, 11, 12 Sharon Township, Washtenaw County

Scale 4" = 1 mile

3	2	1
10	11	12

Sec. Arrangement

Legend

Property line P.P.-Permanent Pasture New Field Line  
 All fields carry 6 yr. rotations. No. indicates yr.  
 corn appears in rotation



TABLE XVI

COMPARISON OF PERCENTAGE OF CORN OF ENTIRE LEVEL AREA THAT IS ADJACENT TO PIVOT COVER  
1937, 1938, 1940, 1941 AS AGAINST 1942, 1943, 1944, 1945, 1946 AND 1947

Township	Sec.	1937		1938		1939		1940		1941		Average		1942		1943		1944		1945		1946		1947		Average % of increase																								
		%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.																					
Ann Arbor	24	1.7	2	6.1	6	2.8	2	7.3	9	6.2	5	4.8	5.2	7.5	9	7.7	6	7.7	8	6.8	10	6.4	10	6.9	8	7.2	8.5	63																						
Lodi	10	10.9	6	19.0	9	8.1	5	13.5	7	9.1	4	11.8	6.2	12.7	12	11.1	8	10.7	11	10.2	12	9.1	8	11.5	13	10.9	10.7	73																						
Pittsfield	15	6.0	3	8.8	4	19.0	10	11.3	5	8.7	6	10.8	5.6	13.9	10	13.9	8	11.9	8	13.2	12	13.6	7	10.8	9	19.9	9	61																						
Pittsfield	22	7.1	4	8.8	8	7.9	3	6.0	5	7.2	3	7.4	4.6	7.5	10	6.6	8	6.5	6	6.4	5	5.4	7	8.4	8	6.8	7.3	59																						
Scio	28	8.3	3	8.3	6	5.8	4	7.5	5	7.4	5	7.7	4.6	5.7	6	5.4	6	5.7	6	5.5	6	4.8	5	5.6	6	5.5	5.8	26																						
Scio	33	7.6	5	9.0	6	4.8	6	10.4	6	5.9	6	7.7	5.8	7.5	7	7.7	8	6.7	8	8.0	7	7.2	10	7.7	6	7.5	7.7	33																						
Sharon	1	15.7	6	9.4	6	8.8	4	14.8	6	17.6	5	13.3	5.4	13.2	10	13.8	11	12.9	12	14.3	12	15.7	12	8.6	8	13.1	10.9	102																						
Sharon	2	2.6	2	12.8	6	9.6	4	10.1	8	11.1	7	9.2	5.4	18.0	14	8.0	12	14.7	12	12.8	12	9.4	10	13.2	9	12.7	11.5	113																						
Sharon	3	10.0	10	11.0	7	9.7	9	11.9	7	4.3	2	7.4	7.0	10.1	14	8.5	13	7.6	10	9.2	14	6.3	10	8.5	13	8.4	12.3	96																						
Sharon	10	2.9	2	0.0	0	1.0	1	5.0	6	4.4	2	2.7	2.2	3.3	6	5.9	8	5.4	8	4.6	7	5.1	8	4.6	7	4.8	7.3	242																						
Sharon	11	12.3	7	5.9	7	5.6	4	6.2	5	9.2	5	7.8	5.6	7.9	8	7.4	11	7.5	11	6.3	8	7.9	12	6.8	11	7.3	10.2	92																						
Sharon	12	6.6	3	8.5	4	12.1	7	15.0	9	12.5	5	10.9	9.6	10.6	15	6.8	9	8.8	15	9.8	17	6.8	12	8.2	14	8.5	13.7	145																						
																							Average																											

<sup>1</sup>Corn percentage of entire area adjacent to pivot cover.

<sup>2</sup>Number of corn contacts to pivot cover.

averages 92% for the twelve sections. It will be found that greater increase is on the sections receiving contour strip cropping. This is mainly due to longer and narrower crop units, thus creating more contacts at each end, and more strips in the same width of terrian. Another important consideration is that since the terrain is more rolling, and the soil type less fertile, more pivot cover is found on these six sections.

The number of contacts to food units rose mainly in some cases due to pivot cover found at each end of the strip. This provided two contacts instead of the usual one when this particular strip is in corn.

Thus on the whole the corn units adjacent to pivot covers on the twelve sections were raised 92%, or not quite doubled, due to new field arrangement.

Pages 113-119 will show the new field arrangements and their relation to pivot cover, also showing the distribution of corn units year after year.

Some fields were not planned since permanent cover of sufficient amounts was not adjacent to the areas.

The item of expenses in the arrangement of fields should be considered in determining the practibility of the above recommendations. Two farms of average size, with average amounts of fences to remove. Mr. Webb's farm in Section 22, Pittsfield

Township is considered as to cost of removing fences.

1100 ft. of fence to remove and grubbing of brush is estimated at:

1 man day at \$3.00	\$3.00
2 tractor hours at \$1 per hour	<u>2.00</u>
Total	\$5.00

This fence row is very light, and the fence has given its best service. The average of the farm is 110 acres.

Mr. Yadley's farm, 110 acres in size, located in section X, Lodi Township is also considered.

1,050 feet of fence to remove and grubbing of brush is estimated at:

1 man day at \$3.00	\$3.00
1 tractor hour at \$1 per hour	<u>1.00</u>
Total	\$4.00

This fence row contains small brush and can easily be plowed with a tractor plow in regular plowing. The tractor hour is due to the removal of a couple of small trees in the fence row.

A few of the farms require no removal of fences while some farms may run as high as \$25.

### Conclusions

#### Present Rotations and Field Arrangement

Southern Michigan, situated in the farming belt of United States, has a rotation typical of the farming belt. Since corn,

wheat, oats, and hay are the main crops, a six year rotation is largely used. Corn, oats, and wheat appears one year in the rotation and hay appears three years. Another six year rotation, not greatly used, contains corn for two years in its rotation, oats and wheat one year, and hay two years. This rotation appears mainly on livestock farms. Oats follows corn, then wheat, and hay for three years, thus completing the rotation.

Field arrangement in Southern Michigan follow one general pattern, or that of rectangles or rectangles approaching squares. The consideration used when the arrangement was made was the number of fields and closeness to buildings. When fields could no longer be reached directly from the buildings a lane was built to facilitate travel to and from the back fields.

The size of a field usually varies with the size of the farm. Large farms usually have large fields, thus vice versa. The field size varies from a few acres to 35 to 40 acres in size.

#### Rotated Crop Percentage

Rotated crops ranged from 19.2% to 78.5% or averaged 53.3% for the twelve sections. Corn ranked first, with 21.7% of rotated acreage or 1.5% of the entire land area. Oats composed 17.9% of the rotated acreage or 9.4% of the entire land area. Wheat composed 12.1% of the rotated acreage or 6.4% of the entire land area. Barley and rye composed 1.4% the rotated acreage or 0.8% of the entire land area.

TABLE XVII

## PERCENTAGES OF EACH CROP IN RELATION TOTAL OF THE

## ENTIRE LAND AREA AND ENTIRE ROTATED AREA

6

	Cora			Small Grain			Hay		
	Corn	Oats	Wheat	Rye & Timothy	Barley & Clover	Alfalfa	Clover	Timothy	Timothy & Clover & Alfalfa
(a) Average percentage	11.5	9.5	6.4	0.8	7.95	6.5	3.3	3.3	1.15
Total land area									
(a) Average percentage	21.7	17.9	12.1	1.4	14.9	12.2	6.2	6.2	2.1
Total rotated average									
									0.7
									1.3
									2.5
									4.7

(a) Weighted arithmetic mean  
 Source: Tables 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

The six hay types, clover and alfalfa, and timothy and alfalfa composed 42.9% of the rotated area, or 22.9% of the entire land area. The miscellaneous rotated crops, comprising soybeans, rape, sorghum, sweet clover, sudan grass, garden and fallow land, composed only 4.7% of the entire rotated acreage or 2.5% of the entire land area.

#### Non-rotated Crop Percentages

The non-rotated crop percentages ranged from 21.2% to 80.8% of the cover by sections. Non-rotated cover includes marsh, timber, blue grass, brush, farmyard, orchard, and gravel pit. Marsh cover ranked first, ranging from 1.3% or an average of 13% of the entire land area. Blue grass pasture was second, ranging from 2.3% to 43.4%, or an average of 11.8% of the entire land area. Timber having sufficient underbrush to conceal the pheasant ranked next. It ranked from 2.1% to 15.6%, or an average of 8.9% of the entire land area. Timber not having sufficient underbrush to conceal the pheasant was next. It ranged from 1.1% to 13.8%, or an average of 7.9% of the entire land area. Brush type was next, ranging from none to 8.4%, or an average of 2.9% of the entire land area. The remaining land area, being 2.9%, was given over to barnyards, orchards and gravel pits.

#### Cropping Practices

Cropping practices are typical of the agricultural belt. Wheat being considered the cash crop, while the other crops are sold extensively.

Corn is fed mainly to livestock, and this effects the cropping practice. Since the present acreage of hay is not sufficient to meet the demands of livestock, corn is cut for fodder. This reduces the amount of cover and food for the pheasant. If the weed growth has been checked either by extensive cultivation or dry weather, cornfield will rate nil as cover.

Cornfields are checked closely to ascertain the minimum amount of waste or loss of ear corn. The shocks are usually shucked or removed from the field before the food situation generally becomes critical for the pheasant.

The small grains are either cut by binder, shocked, and threshed by a separator, or harvested with a combine. Waste grain is left by either the binder or combine. Better and more cover is left by the combine and less disturbance to the pheasant since the operation is a single one. Also, nesting will have a higher chance for success, due to the later period of cutting.

Hay making is a great hindrance to pheasant nesting. A large percentage of nests are destroyed or hens leave their nests due to the cutting machine. On most farms the nests are moved over, thus destroying it or even crippling the hen. Alfalfa causes the greatest losses due to earlier period of cutting and number of times of cutting.

### Farm Operations

The farm operations have their effect upon the pheasant. Most of them bear their effect through cover. Hay-making, cultivating, harvesting, plowing, pasturing, fencing, weed burning, and brush cutting all effect the cover for the pheasant and have harmful effects. Seeding, cultivating, harvesting, plowing, hauling manure, and threshing effect the food situation of the pheasant. Many of these operations favor the food supply, while others are harmful. Cultivating, harvesting and hauling manure aid the pheasant, while harvesting and cultivating may be harmful and usually is. Brush cutting and wood-cutting usually produce their effects by molestation.

### Reason for Present Pheasant Population and Possible Increase

The pheasant population of Southern Michigan is about average with other sections of the country. The land is capable of producing a higher population if the cropping practices, and field arrangements were changed. A spring pheasant population of 13.4 birds per section is entirely too low, and this could be increased if fence rows were not kept clean, marshes not pastured, woodlots ungrazed, brushy areas encouraged and field arrangement changed. Section 24 of Ann Arbor Township has a breeding population of thirty some hens, and many young birds were observed on the section in August of 1941. Section 24 of Ann Arbor Township does not have a high population, but ungrazed and protected marshes of this section will show the possibilities.



Summary

1. Crop rotations are generally practised throughout the eastern half of the United States, and that the North Central States are the leaders.
2. Field arrangement was mainly done during the settlement of the country, and changes were made as farming conditions changed.
3. The percentage of each crop remains fairly constant year after year.
4. Southern Michigan is quite well suited for pheasant production, but changes in field arrangement, cropping practices, and care of permanent cover will have to be made to create a bigger pheasant supply for the hunter.
5. Natural features such as marshes, woodlands, brush and herbaceous areas are a great aid in pheasant production.
6. Corn is the principal food of the pheasant, and in some cases it is the limiting factor while in other cases lack of cover and communication lanes are the limiting factors.
7. Fields can be so arranged to present the pheasant with almost twice the suitable area for its life equation. Further increase of pheasant populations would be gained by better cropping practices and care of permanent cover.
8. Present rotations are not hindrances but an aid to pheasant production.
9. Combining of small grains is an aid to pheasant production through the result that the stubble is higher, creating

better cover; also waste grain is generally increased due to more straw broken stems.

10. Present practice of cutting corn for shredding for livestock is poor pheasant management; a higher percent of corn should be hand shucked from standing stocks.
11. More than 145 acres, average per section, is in hayland, providing a large nesting area per section.
12. New field arrangements are good for soil conserving practices and farm practises and does not raise the production cost per crop unit.

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