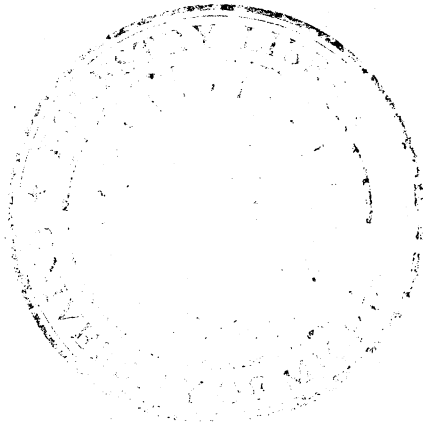


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AN INVESTIGATION OF THE MARSHES OF WASHTENAW COUNTY,
MICHIGAN RELATIVE TO THEIR VALUE TO WILDLIFE

Dunbar Robb

A dissertation submitted in
partial fulfillment of the requirements
for the degree of Master of Forestry
at the University of Michigan.

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INTRODUCTION

The land comprising what is now Wastenaw County, Michigan was formerly densely forested with varying associations of hardwood species including red, white, and black oak, hickory, beech, sugar maple, elm, ash, and basswood which inhabited the dryer sites, as well as tamarack, aspen, yellow birch, willow, and many shrub species which grew on the wetter organic soils. According to Veatch (1930), about 97 % of the total area was wooded, while 3 % consisted of marsh land and water.

The same author has estimated that but 12 % of this original forest cover remains. The clearing of uplands has made possible extensive agricultural development, but the removal of trees from wet, peaty soils, plus grazing and burning has usually resulted in the replacement of such forested areas by marsh land.

The continuous accumulation of plant material in the bottoms and around the margins of lakes and ponds has also increased the total marsh area by transforming bodies of water into shallow basins containing peat and muck soil. At the present time thousands of acres of marsh land make up considerably more than the original 3 % of the surface area.

During this investigation as much pertinent information as possible has been obtained upon the past history and present day conditions of a representative group of marsh areas in Washtenaw County.

Wight (1934) has classified the vegetative types of Southern Michigan upon the basis of origin and succession. Letter symbols have been used to distinguish between the various phases of the xerosere and hydrosere, while numerical figures have been assigned to the different successional stages comprising each phase. These stages have been arranged in the order in which they originate either upon undisturbed areas of dry land or in the normal transformation of open water to comparatively dry upland.

Michigan marsh lands belong to the hydrosere, the successional series having its origin in open water. Five distinct phases of this sere have been recognized. Wight has designated these as the lake phase, the bog phase, the stream flood plain type, the seepage type, and the kettle hole type. All successional stages included under these various phases are continually tending toward higher types of vegetation with the final stage in each case being occupied by the beech-maple forest which comprises the climax in this region.

Marsh lands are characterized by the presence of herbaceous vegetation rooted in the soil. Consequently, the

term marsh may be correctly applied to any area belonging to the hydrosere whose successional development has progressed to the extent that present vegetation consists of firmly rooted herbaceous plants. The term bog, on the other hand, should be applied only to herbaceous vegetation which either forms or emerges from a floating mat of organic material. This floating mat may either partially or completely cover an existing body of water.

Herbaceous marsh vegetation is normally followed by a growth of shrubby plants. As these shrub species begin to develop the area commences to pass from the marsh into the swamp stage. Once plants of the woody type are completely dominant on such an area it should be known only as a swamp, since successional development would have progressed beyond the marsh type.

Under present conditions the numerous marsh land areas in Washtenaw County make up a large percent of the natural game habitat of this region. Marshes are also of considerable importance to local farmers, since the majority of them have been put to some definite type of use. In addition, the past ten years have brought about an increased hunting pressure created by numerous local sportsmen and by the proximity of the area to Detroit. Such a condition makes the creation and maintenance of optimum game populations very desirable, while the trend indicates possibilities for increasing rural income through the controlled

harvesting of these animals.

Particular attention has been given to the different uses of marsh areas by the local farmers and to the effects of these uses upon marsh wildlife populations. An attempt has been made to correlate all probable uses including wildlife in order to arrive at certain conclusions regarding the relative value of different types of areas to game species and particularly to the ring-necked pheasant. Such a correlation plus certain economic data have made possible a number of recommendations relative to the practical utilization of local marsh lands.

Several hundred areas have been visited during the course of this work and numerous individuals associated with the different types of management consulted. From these men and from their areas have come many valuable additions to the writer's total fund of information gathered from an intensive study of thirty-five marshes.

The purposes of this investigation have been (1) to evaluate the local marsh areas for wildlife, (2) to determine their place in the present land use program, and (3) to recommend certain specific management principles which should make possible a more practical use of these marshes and, at the same time, improve the game habitat in this region.

GEOLOGY

Washtenaw County lies in the glaciated plains portion of the Central Lowlands province of the United States and consists primarily of moranic uplands and glacial lake bottoms. Here the rock surface has been covered to an average depth of 300 feet by a glacial drift consisting of numerous large boulders and small stones mixed in a sandy or clayey matrix (Leverett, 1917).

The same author's investigations have also shown this material to be the product of two or more ice invasions, since between successive layers are found peat beds, soils, and other definite indications of the previous existence of extensive periods of warm climate probably similar to that prevailing in this region at present.

Among the more important geological features of Southern Michigan are the terminal and ground moraines which are frequently associated with broad, sandy, outwash plains, the latter being created by escaping water. Terminal deposits are usually rolling, sandy or gravelly accumulations formed wherever the edge of an ice sheet remained stationary over a long period of time, while the ground moraines or till plains consist largely of clay soil and are located between the above mentioned terminal moraines.

On the whole the surface physiography of Washtenaw County is the result of the action of the Huron-Erie and Saginaw glacial lobes which have been attributed to the late Wisconsin stage of the Pleistocene Era (Russell and Leverett, 1915, P.6). Three distinct physiographic divisions exist within this area and cross the county diagonally from the northeast to the southwest (Wood, 1922).

The northwestern one-third of the county is occupied by a very conspicuous system of rough, interlobate moraines. Irregularity is here the chief characteristic of the land surface with many steep knolls adjoining deep basins. These latter depressions are frequently occupied by existing lakes or give definite evidence of the presence of water at some time during the past. Houghton muck and Greenwood peat are the prevailing soil types in such locations.

Similar soils are also encountered in certain areas where it is apparent that their formation has been due to the presence of a high water table which closely approaches the soil surface. Here again the resulting vegetation is often marshy in character.

In this particular part of the county, Rifle peat, Houghton muck, and Kerston muck are frequently found either in comparatively narrow strips or covering more or less extensive areas in glacial outwash channels and along existing streams. Such marsh sites are encountered most frequently in the northwestern portion of the county, but similar types do occur in

the central division. Basically, these marshes are similar to those found in the ground or terminal moraines in that they can usually be associated with lake basins or high water table conditions.

The central division, which adjoins the above mentioned section, consists of a broad clay moranic belt occupying the strip of land between Portage lake and Ypsilanti. The great majority of this land is high and rolling with the surface structure composed largely of till plains and clay moraines. Here again, marsh types similar to those described above are found, both in the terminal and ground moraines, those of the latter group being encountered most frequently in Dexter, Lima, Freedom, Scio, Northfield, and Pittsfield townships.

Glacial outwash channels provide many marsh sites in this part of the county with frequent examples located in Superior, Pittsfield, Saline, and Bridgewater townships.

Marsh vegetation can also be found occupying many of the depressions commonly known as kettle holes. The typical origin of such depressions lies in the detachment of blocks of ice from receding glaciers and the burial of these blocks beneath layers of surface soil. Subsequent melting of this ice has allowed the soil covering to fall below the adjacent ground level. While the great majority of these depressions are small, averaging approximately an acre and a half in size (Spencer, 1940), certain others are much larger and cover four or five hundred acres (Scott, 1921).

The southeastern portion of Washtenaw County is limited by the shore lines of ancient glacial lakes and is known as the Lake Plain District. Here the flatness of the ground surface is in marked contrast to the generally rough character of the northeastern and central divisions.

In the southeastern portion, low, sandy ridges representing the locations of ancient beaches or off shore bars comprise the only variations in the otherwise uniform ground surface. Such a ridge is followed by the Stony Creek and Ridge Roads which run southwest from Ypsilanti through Mooreville in York township. This particular ridge represents the ancient shoreline of the former Lake Whittlesey (Wood, 1922).

Although this region lacks marked depressions, many damp, poorly drained areas do occur. However, the soil types involved are usually clay loams or loamy sands, and peat or muck is rarely found (Veatch, 1930). No lakes occur in this region, consequently its few marshes appear to be the products of arrested drainage which has in turn resulted in a sufficiently high water table to saturate the surface soil.

Any of the three divisions may contain spring fed seepage areas. These are characterized by a gradual flow of water through the surface layers of the soil and usually occur on a comparatively flat surface. This surface need not be level, since sloping hillsides frequently provide examples of this condition. However, the true seepage area is not usually contained in depressions such as are characteristic of lakes or kettle holes.

The above data may be briefly summarized as follows:
Washtenaw County has been separated into three physiographic divisions. Marsh areas found throughout these divisions may be classified geologically under the following types:

A. Depressions or hollows

1. Kettle hole type
2. The lake basin type
3. High water table type

B. Practically level surfaces

1. High water table type
2. Seepage areas

SOILS

The organic soil types of North America have been divided into three general groups known as the Oligotrophic, the Mesotrophic, and the Eutrophic (Dachnowski-Stokes, 1933). This division has been based principally upon profile structure, degree of disintegration, and acidity.

The Oligotrophic group is comprised of acid soils having a pH range of from 3.5 to 4.5 and generally showing surface layers of fibrous, sphagnum moss peat. Such soils are particularly poor in mineral nutrients.

The Mesotrophic group includes organic deposits whose reactions vary from strongly acid to neutral. Their surface layers are generally brown to dark brown or black. These types occur most frequently in the glaciated portions of the Lake States.

The Eutrophic soils, representing the final group, are generally alkaline but occasionally show a very slightly acid reaction.

Dachnowski-Stokes (1933) has referred to the organic deposits of Southern Michigan as soils having a more or less complex structural development and falling generally into the Mesotrophic group. Consequently, the majority of local marshes may be expected to show chemical reactions varying from neutral to strongly acid.

Origin of Organic Soils:

Organic soils are classified upon the extent of decay of vegetable matter. Decay consists of a series of complicated changes resulting from the growth and development of bacteria and fungi in the decomposing material. These organisms, under ordinary conditions of air and moisture, feed upon plant tissue using certain of its components for their own nourishment and thus breaking down the vegetation into simpler compounds. However, the activity of such decay-producing forms is curtailed by excessive dryness or excessive moisture, either of which result in a reduction in the rate of decomposition.

Peat and muck beds underlying the majority of marsh land areas have resulted from the presence of either a permanent or an intermittant body of water.

Such a condition would soon result in the growth of aquatic vegetation rooted in the underlying mineral soil. As certain parts of this vegetation died they would fall either into the water or onto an extremely moist ground surface. Here their decomposition would be considerably retarded or checked completely, resulting in the accumulation of partially decayed or undecayed material upon the soil surface. Continuous contributions of this type would increase the depth of the organic deposit until a definite bed of peat or muck had been formed.

Similar beds of organic material may arise as the result of accumulations made primarily at the top or around the sides of a body of water. Such development usually involves

the formation of a floating mat and should be properly classified under the bog sere.

Since organic deposits are generally formed in depressions in the soil surface, the type of development and the thickness of a particular deposit is often determined by the depth of the basin in which it lies. Martin and Uhler (1939) have recorded the occurrence of coontail, Najas, Myriophyllum, and Potamogeton in water thirty feet deep. Such bodies of water could be expected to follow the lake series of transformational development since filling could begin in the bottom of the basin. Lakes having a depth greater than thirty feet would ordinarily be filled by organic matter originating around the edges, with a floating mat of this material extending over the water surface.

Mineral soils often become saturated with water in shallow depressions, on poorly drained flat land, or on spring fed seepage areas. Such a condition fosters marsh vegetation and shallow organic deposits usually develop over the area. Plants found on these sites include certain rushes, sedges, grasses, and other herbaceous species.

Organic deposits of all types continue to increase in depth until drying of their surface layers permits the growth of decay-producing organisms. These organisms decompose dead plant material and make further additions to the original deposit impossible.

Actual cases of development are often complicated by fluctuating water levels or by the excessive development of

certain plant species. However, the above discussion indicates, in a general way, the process by which deposits of peat and muck originate and subsequently find their way into the recognizable soil types of a region.

Organic vs. Mineral Soil:

Peats and mucks are composed primarily of organic plant material and thus differ from the common mineral or inorganic soil. Between these two groups lie the "border" soils in which large quantities of organic matter are found in mixture with the mineral elements. The principal representatives of the latter group found in the vicinity of Washtenaw County are the Maumee, Clyde, Newton, Berrien, Brookston, Conover, and Brady mineral soils (Veatch, 1930). These often support marsh vegetation similar in composition to that found on the true organic types.

"As a class the organic soils are characterized by a low volume weight or low specific gravity, high water-holding capacity, high specific heat, high shrinkage on drying, generally high total nitrogen and low potash content, and variable (ranging from high to very low) lime and phosphorous content. -
----- Under cultivation they undergo change from their virgin conditions much more rapidly than do mineral soils. They are peculiar as soils in that they are combustible and when drained and dried out may be burned off more or less completely. Where under cultivation, those areas of nearly pure organic matter lack coherence at the surface when dry and, owing to that fact and their low specific gravity, are subject

to blowing." (Veatch, 1930, P.26).

Local Organic Soils:

Five different organic soils have been recognized by Veatch as occurring in the region covered by this investigation and it is from the work of this author (1930) that the following type names, descriptions, and direct quotations have been taken.

With the exception of Kerston muck, the types mentioned below appear to represent merely different degrees of decomposition of organic material which can be associated with definite stages of ecological succession. Undecomposed material has been deposited during the initial phases of development, while the generally highly decomposed mucks have resulted from increased decomposition associated with hardwood swamps or advanced ecological stages.

The local organic soils consist of Kerston muck, Carlisle muck, Houghton muck, and Rifle and Greenwood peat.

Kerston muck, although so named, actually consists of a mixture of alluvial mineral matter in proportions up to 50 or 75 %. In such cases the mineral matter may be "either disseminated or in distinct layers of alluvial deposition". The organic matter is generally dark in color and resembles Carlisle muck. In the majority of cases this type is said to be medium to high in its fertility rating and to give an alkaline reaction. However, as might be expected, it occurs principally in flood plains of large streams and consequently is little used.

Carlisle muck is dark brown or black in its surface layers showing a coarse, granular structure and a loamy texture. In typical cases the organic material becomes finer just below the surface and "breaks with an angular or conchoidal fracture when dry". Below this layer and at a depth ranging from 15 to 20 inches is usually found a quantity of coarse, less decomposed plant material often indistinguishable from that underlying Rifle peat and Greenwood peat. Carlisle muck is comparatively rich in lime and phosphorous, poor in potash, and practically neutral or alkaline in reaction. Its content of inorganic matter is generally higher than that of other organic soils, however, more than 75 % of its material is volatile or combustible.

Houghton muck has been described as dark brown or nearly black and finely fibrous in the surface layer. This material usually rests upon underlying deposits very similar in structure to those of other organic soils. Deposits of this type are nearly pure organic matter and are generally associated with a high water table and with only moderate decomposition of plant material. "The surface soil is moderately acid or slightly alkaline in reaction".

Rifle peat is granular, woody, and loamy, and nearly black or brown in its surface layers. However, it shows very little decomposition in its lower layers "where the material is coarse in texture, either woody or fibrous, feltlike, and not compact". Soils of this type are often fairly rich in lime and range from almost neutral to strongly acid in reaction,

but seldom reach the degree of acidity characteristic of Greenwood peat.

"Greenwood peat is yellowish brown or reddish brown in color, coarse in texture, uncompacted, fibrous, spongy, and feltlike". As is the case with Houghton muck, parent plant material here shows very little decomposition and possesses a low ash content. This soil is strongly acid and generally low in lime and phosphorous. It is often associated with fluctuating water tables which under normal conditions range within a few inches of the surface.

Relation to Vegetation:

The organic component of the stratified Kerston muck is similar in most respects to continuous deposits classified as Carlisle muck. Consequently, its relation to vegetation is largely the same as that of the latter type.

Veatch (1930) states that Carlisle muck supports in many localities a swamp growth with stands consisting primarily of elm, ash, and soft maple. Tamarack, aspen and willow occur, but do not attain dominance.

On cleared areas, Carlisle muck supports a good growth of sedges, grasses, and herbaceous plants with a tendency, under suitable water table conditions, to pass into the shrub stage and on into the mature swamp.

Houghton muck, principally because of its high water table and comparatively shallow depth of organic deposit, is characterized by the continued dominance of sedges and other herbaceous species including bluejoint grass. Shrubs and trees

are either few and scattered or completely lacking on this type.

Rifle peat often supports stands of tamarack and aspen accompanied by such shrubs as red-osier dogwood, common winterberry, elderberry, and huckleberry. Following clearing, this soil is usually occupied by dense stands of sedges, wire grass, and bluejoint.

Greenwood peat, a typical bog soil, usually supports such shrubs as blueberry, huckleberry, Cassandra, Kalmia, and chokeberry, while Sphagnum and other mosses predominate among the herbaceous plants. These species are principally the result of a high water table and a very strongly acid reaction. Trees are generally both fewer and smaller than those occurring on Carlisle muck or Rifle peat.

Soil Profiles:

Although at the beginning of this investigation the writer had planned to make a study of the soil profiles in each of the 35 marshes which were mapped, the results of work done in six of these areas checked so closely with the material presented by Veatch (1930) that further work of this type was deemed unnecessary.

An instrument devised by D. L. Spencer (1940), and similar in construction to the Davis Peat Sampler, was used and found to work satisfactorily, since pure cores were brought up from depths as great as 18 feet.

Borings were made at stations located usually one chain apart along a line extending from the edge of the marsh

to the center of the basin. At each of these stations samples were obtained from the ground surface, 2 feet, 6 feet, and from each 4 foot interval thereafter until mineral soil was reached or a hard substratum prevented further penetration by the sampler. All samples were labeled and brought into the laboratory for examination. A record of this work has been presented on page 19.

In spite of the fact that the nomenclature applied to the various grades of peat and muck seems to be standardized by general usage, it was felt that a brief explanation would be desirable.

Muck soil consists of a pasty, highly decomposed, organic material having a characteristic loamy texture. Fibrous peat contains roots, fibers, and other parts of herbaceous plants such as the sedges, reeds, and rushes. Woody peat is composed of coarse, organic material derived from trees and shrubs which formerly occupied the site. Pulpy peat designates material in which no definite plant structures are distinguishable. Deposits of this type were derived from microscopic plants such as the algae and diatoms.

The terms marl and loam silt have also been used in recording the profile data. Marl represents precipitated calcium carbonate which came to rest upon the bottom of a lake, while loam silt is used to describe mineral soil which has eroded onto the surface of the organic deposit.

The results of this phase of the work are presented in the following table.

Table 1.

Soil Profiles

:Marsh:	Soil	:Geological:	Vegetation:	Dist. Across along:
: No. :	Type :	Type :	:	Transect Line :
: 20 :	Carlisle:	Kettle :	Sedge :	3 Chains :
:	Muck :	:	:	:

: Profile	:Loam:	Black:	Fibrous:	Clay :	Hard Clay :
:	Silt:	Muck:	Peat :	Loam :	:
: Station A	:	:	— :	:	24" :
:Margin of Marsh:	0-2":	2-8" :	— :	8-24" :	Below Surface:
: Station B	— :	:	:	:	12' :
:Center of Marsh:	— :	0-16" :	16"- 6' :	6-12' :	Below Surface:

:Marsh:	Soil	:Geological:	Vegetation:	Dist. Across along:
: No. :	Type :	Type :	:	Transect Line :
:	Carlisle:	:	Herbaceous-:	:
: 1 :	Muck :	Lake Basin:	Shrub-Sedge:	4 Chains :

: Profile	:Loam:	Black:	Woody:	Fibrous:	Clay :	Sandy :
:	Silt:	Muck :	Peat :	Peat :	Loam :	Marl :
: Station A	:	:	:	:	26"Below:	12"Below :
:Margin of Marsh:	0-1" :	1-8" :	8-20" :	20-26" :	Surface:	Surface :
: Station B	— :	:	:	:	:	12'Below :
:1ch. from Margin:	— :	0-18" :	18"6' :	6-12' :	— :	Surface :
: Station C	— :	:	:	:	:	17'Below :
:Center of Marsh:	— :	0-2' :	2-8' :	8-17' :	— :	Surface :

:Marsh:	Soil	:Geological:	Vegetation:	Dist. Across along:
: No. :	Type :	Type :	:	Transect Line :
:	Houghton:	:	:	:
: 6 :	Muck :	Kettle :	Sedge :	3½ Chains :

: Profile	:Fibrous:	Pulpy:	Hard
:	Peat :	Peat :	Clay
: Station A	:	— :	:
: Margin	: 0-2' :	— :	2' Below Surface :
: Station B	:	:	:
:1 ch. from Margin	: 0-5' :	5-6' :	6' Below Surface :
: Station C	:	:	:
:1½ ch. from Margin	: 0-6' :	6-7½' :	7½' Below Surface :
: Center	:	:	:

Soil Profiles Cont'd.

Marsh No.	Soil Type	Geological Type	Vegetation	Dist. Across along Transect Line
2	Muck	Kettle	Sedge	5 Chains
Profile				
		Loam	Fibrous	Pulpy
		Silt	Peat	Peat
				Sandy Clay
Station A				
	Margin of Marsh	0-5"	5"-2'	2' Below Surface
Station B				
	1 Ch. from Margin	0-3½'	3½'-4'	4' Below Surface
Station C				
	2½ Ch. from Margin	0-5'	5-6'	6' Below Surface

Marsh No.	Soil Type	Geological Type	Vegetation	Dist. Across along Transect Line
15	Peat	Table	Shrub-Sedge	7 Chains

Profile				
		Fibrous	Woody	Fibrous
		Peat	Peat	Peat
				Hard Clay
Station A				
	Margin	0-3"	3½ -1½'	1½- 2' : 2' Below Surface
Station B				
	1Ch. from Margin	0-6"	6"-6'	6-7' : 7' Below Surface
Station C				
	2Ch. from Margin	0-6"	6"-7½'	7½-9½' : 9½' Below Surface
Station D				
	3½Ch. from Margin	0-6"	6"-8'	8-10' : 10' Below Surface
Center				

Marsh No.	Soil Type	Geological Type	Vegetation	Dist. Across along Transect Line
14	Peat	Table	Shrub-Sedge	5 Chains

Profile				
		Fibrous	Woody	Clay
		Peat	Peat	Loam
Station A				
	Margin	0-6"	6" -4'	4' Below Surface
Station B				
	1Ch. from Margin	0-2'	2-6'	6' Below Surface
Station C				
	2½Ch, from Margin	0-2'	2-8'	8' Below Surface
Center				

In view of the fact that soil profile data have shown very little decomposition of organic material underlying the local marshes and since woody peat is frequently found in the deposit, it seems probable that the majority of these areas have developed through the bog sere, reached the mature swamp type, and then reverted to marsh conditions following the removal of the trees. In such cases, continued burning and grazing have been largely responsible for the maintenance of the present herbaceous vegetation.

Table 2.

Location of Marshes Studied

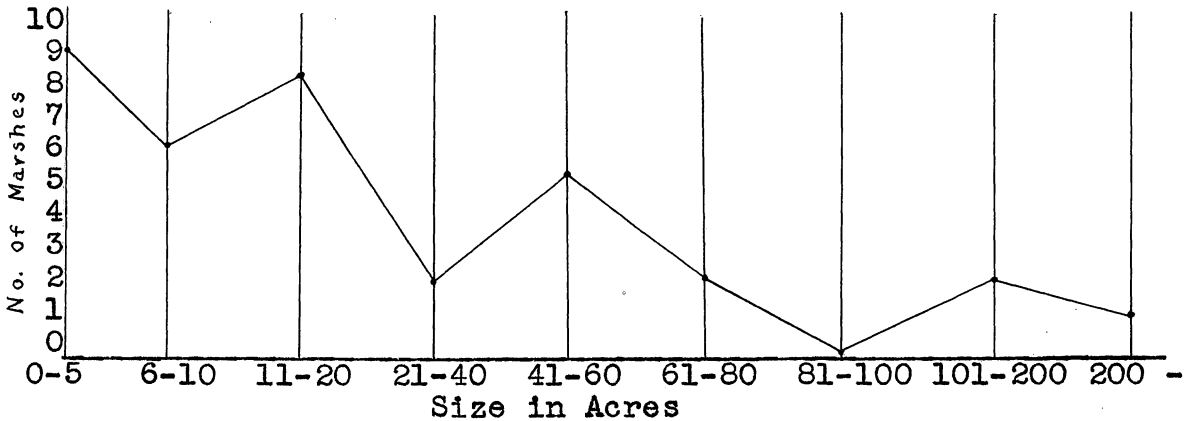
Marsh No.	Township	Section	Location
1	Scio	26	South $\frac{1}{2}$
2	Scio	10	Southwest $\frac{1}{4}$
3	Ann Arbor	10	Northwest $\frac{1}{4}$
4	Ann Arbor	10	Northwest $\frac{1}{4}$
5	Ann Arbor	4	Southwest $\frac{1}{4}$
6	Webster	15	Southeast $\frac{1}{4}$
7	Scio	28-29-32-33	Junction
8	Scio	18	Northeast $\frac{1}{4}$
9	Scio	19	Southwest $\frac{1}{4}$
10	Scio	19	Southwest $\frac{1}{4}$
11	Lodi	12	Northeast $\frac{1}{4}$
12	Ann Arbor	24	East $\frac{1}{2}$
13	Pittsfield	28	Northwest $\frac{1}{4}$
14	Pittsfield	28-29	East $\frac{1}{2}$ - West $\frac{1}{2}$
15	Pittsfield	35	Southwest $\frac{1}{4}$
16	Dexter	19-20-29-30	Junction
17	Scio	2	Northeast $\frac{1}{4}$
18	Freedom	2	Northeast $\frac{1}{4}$
19	Freedom	2	Northeast $\frac{1}{4}$
20	Freedom	2	Southwest $\frac{1}{4}$
21	Freedom	2	Southwest $\frac{1}{4}$
22	Freedom-Lima	4-33	Northeast $\frac{1}{4}$ - Southeast $\frac{1}{4}$
23	Freedom	2	Northwest $\frac{1}{4}$
24	Sharon	3	Southwest $\frac{1}{4}$
25	Lima	34	Southwest $\frac{1}{4}$
26	Freedom	11	West $\frac{1}{2}$
27	Freedom	11	Southwest $\frac{1}{4}$
28	Dexter	8	Northwest $\frac{1}{4}$
29	Lodi	17-20	West $\frac{1}{2}$ - West $\frac{1}{2}$
30	Freedom	12-13	Southeast $\frac{1}{4}$ - Northeast $\frac{1}{4}$
31	Freedom	2	Northeast $\frac{1}{4}$
32	Sharon	10	Northwest $\frac{1}{4}$
33	Freedom	1	North $\frac{1}{2}$
34	Sharon	3	South $\frac{1}{2}$
35	Scio	22	Southwest $\frac{1}{4}$

SIZE AND DISTRIBUTION

Washtenaw County includes an area of 714 square miles or 456,960 acres. Marshes occurring in this region vary in size from less than an acre to more than one and a half square miles. The average size of the 35 marshes comprising the random sample used for this study is 32.65 acres. The size distribution of these areas can be seen from the following graph:

Figure 1.

Size Distribution



Data have also been collected from cover type maps which were made available by the School of Forestry and Conservation. All marsh areas shown on these maps were planimetered and the data tabulated as follows:

Table 3.

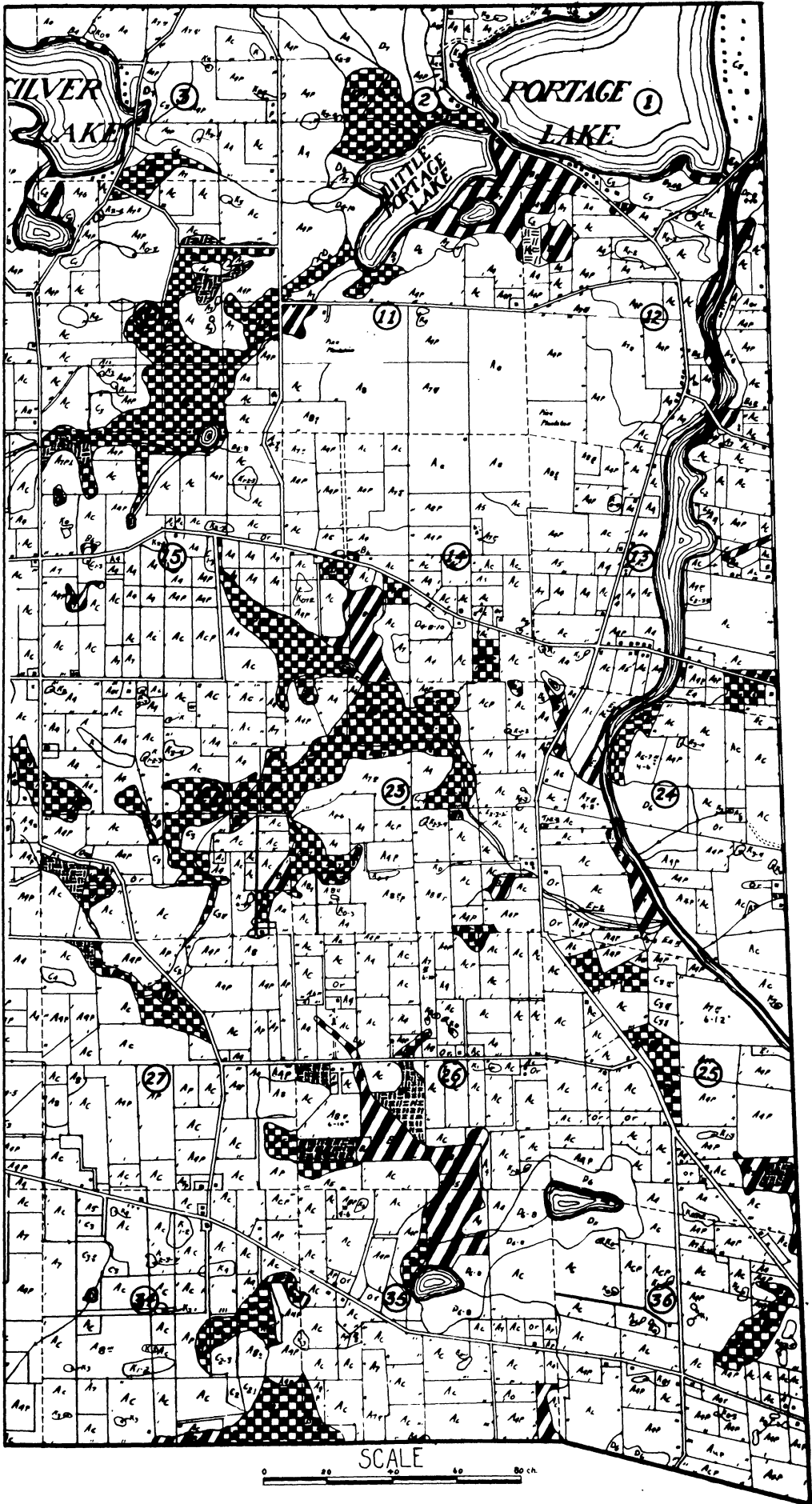
Marsh Acreage

Township	No. of Sec. Planimet'd	Total Marsh Acreage	Avg. No. Ac. of Marsh Per Sec.	Number of Marshes	Avg. No. of Marshes Per Sec.	Avg. Size of Marshes
Ann Arbor	36	444.48	12.37	27	.8	16.49
Dexter	36	1360.90	37.80	62	1.7	21.95
Freedom	24	937.40	38.93	40	1.7	23.43
Lima	18	1843.49	102.41	25	1.2	73.74
Lodi	30	209.00	6.96	19	.6	11.00
Lyndon	24	1328.50	55.35	38	1.6	34.69
Northfield	29	937.53	32.33	76	2.6	12.33
Scio	36	833.60	23.16	52	1.4	16.03
Sharon	18	1449.78	80.54	45	2.5	32.22
Sylvan	24	1556.60	64.86	44	1.8	35.37
Webster	36	1449.14	40.25	44	1.2	32.93
Average						
Township	28.2	1122.86	44.99	42.9	1.5	28.19

This table indicates that marsh land might be expected to comprise approximately 6.6 % of an average section or 6.2 % of the average township in Washtenaw County.

All data included in Table 3 are based upon a complete survey of the specific areas indicated, while the table as a whole represents a 43.56 % sample of the total area of Washtenaw County.

A typical distribution of marsh land areas is shown in Figure 2. This figure also illustrates the type of map from which the data comprising Table 3 have been taken.



MARSH TYPE LEGEND

- | | | | | | |
|---|----------|---|------------|--|---------|
|  | PASTURED |  | UNPASTURED |  | CROPPED |
|---|----------|---|------------|--|---------|

Figure 2.

ECOLOGY

Ecologically, marsh lands consist of one or more of the various developmental stages of each of the different phases of the hydrosere. These phases originate either in the open water of lakes and ponds or upon the saturated soil of stream flood plains or spring fed seepage areas.

Although soil formation within marshes is closely associated with the ecological development of vegetation, the previous discussion of that process has made its inclusion here unnecessary.

The normal development of the lake phase of the hydrosere begins with the stage of submerged vegetation. This is characteristic of bodies of open water having a depth of approximately 30 feet or less and usually consists of such plants as the Algae, Elodea, Chara, the pondweeds, and wild celery.

Organic matter derived from these plants soon becomes deposited upon the bottom of the lake. As this process continues, an ever rising peat deposit is formed. The depth of the water occupying the basin is thus being gradually reduced.

Although the entire developmental process is very gradual, the second successional stage can usually be recognized when the water depth has been reduced to about 6 or 8 feet. This has been designated as the stage of floating vegetation and is characterized by the presence of duck weeds,

water lilies, pond lilies, smartweeds, and other similar species.

These plants continue to contribute organic material to the underlying deposit which, after a time, reaches a height closely approaching that of the water surface. Under these conditions the third successional stage is usually established. This results from the development of emergent vegetation rooted in the soil, but having the majority of its growth extended above the surface of the water. Reeds, rushes, bulrushes, and certain sedges are generally characteristic of this stage.

As plants constituting the emergent vegetation grow into dense stands, they transform the area into the first of the true marsh types. Here continued increases in the depth of the organic deposit result in proportionate reductions in the surface water or soil moisture occurring in the marsh. These reductions are largely responsible for the vegetative changes which allow the area to pass gradually into the sedge, sedge-grass, and mixed herbaceous types.

The latter type represents the last of the marsh stages in which purely herbaceous plants are found occupying the area, since it is normally followed by a more or less heterogeneous cover characterized by the addition of certain shrubby species to the existing vegetation. Although this herbaceous-shrub-sedge type is properly classified as a marsh, it actually exists during the period of transition from marsh to swamp.

The establishment of woody plants within a marsh usually results in the destruction of certain amounts of the herbaceous vegetation. Under normal conditions, this process

leads to the complete dominance of the shrub species and, consequently, the creation of the first of the swamp types. Further development can be expected to result eventually in the occupation of the area by a stand of beech and maple, since this represents the climax type in Southern Michigan.

The developmental process characteristic of areas belonging to the bog phase differs somewhat from that described above. In this case, filling of a basin normally begins around the margins of a lake at or near the water surface. Here the organic deposit takes the form of a floating mat which extends itself in a lakeward direction and eventually covers the surface of the water.

During this process material is continually sifting down from the lower surface of the mat and creating a continually rising organic deposit in the bottom of the basin. In the shallower portions of the lake this deposit soon becomes continuous with that of the floating mat, resulting in a firm bed of peat or muck.

Although portions of the area characterized by the presence of the floating mat are definitely of the bog type, others within which herbaceous vegetation is growing upon a solid organic deposit may be correctly known as a marsh. However, the dominance of herbaceous marsh vegetation on areas of the type described above is, under normal developmental conditions, comparatively short lived, since the extension of the floating mat is followed closely by the growth of shrubby plants such as leather-leaf and poison sumac. Further development transforms the area into the more advanced stages of the

swamp type and eventually into the beech-maple climax.

Certain other moist sites such as stream flood plains or seepage areas normally support marsh vegetation characterized by sedges or mixed herbaceous plants. These, too, gradually pass into the swamp and reach the climax forest.

Actually very few areas are permitted to proceed undisturbed through this normal series of successional changes, since numerous factors may operate to alter the logical sere. In general, these factors or causes of disturbance may be divided into two groups and classified upon the basis of origin as either natural or man made.

Natural Disturbances:

Davis (1907) has pointed out that in the initial stage of the hydrosere an excessive development of chara, a plant often encrusted with a lime deposit, may almost completely check, at least temporarily, the normal development of other submerged vegetation and thus considerably retard the entire process.

Various animals may also influence conditions. The muskrat, for example, may, by selective feeding, hasten the destruction of a particular plant or group of plants and thus make room for a greater variety of species having a high peat forming value. Such activity would apparently tend to speed up the developmental process. On the other hand, these animals may consume certain plants which would otherwise be able to establish themselves upon the area, and thus retard the process.

In practically all marsh land areas a certain amount

of water level fluctuation may be expected. However, prolonged or excessive droughts, as well as extended periods of abnormally high precipitation, often show marked effects upon marsh vegetation. These effects are ordinarily brought about as a result of the lowering or raising of the local water table, since any change of this type would almost immediately alter moisture conditions within the marsh. Provided this alteration were both sufficient in its intensity and prolonged in its existence, definite changes could be expected in the composition of the plant cover, since soil moisture content is apparently the most important factor affecting local distribution of plants within a given area.

Man Made Disturbances:

Changes of a similar nature may be expected to result from any definite alterations of existing drainage conditions. Activity of this type may be intentional in that old channels may be cleared or new ditches dug. Either of these should reduce the total amount of water present and thus effect the local vegetation. On the other hand, dams may be constructed or channels and outlets intentionally filled. Accidental cases of stoppage can also be found, and are often associated with poorly planned drainage projects. All such conditions should result in increased flooding of the area with a subsequent change in vegetative cover.

The use of fire in marsh lands may also have noticeable effects upon existing plant species, while the clearing of swamp areas either by burning or by cutting usually results, at least

temporarily, in the reversion of the vegetation to herbaceous types characteristic of the marsh. Clearings of this type, when accompanied by drainage, normally result in the occupation of the area by sod forming grasses.

Since several herbaceous plants are commonly associated with burned areas, it seems probable that the use of fire in marshes has a tendency to increase the total number of these species which can be found growing on a particular site. However, as the principal effects of burning are probably determined by the time, intensity, and frequency of the fire, a fairly wide range of conditions might be expected to result. In view of this fact, certain consideration has been given to the local burning practices. Results of this work are included under the heading "Activities Associated with Farm Uses".

Many of the marsh lands of Southern Michigan are used for the pasturing of livestock including sheep, cattle, and horses. Although the effects of this and other practices are taken up in another part of this report, it seems desirable to mention here that this factor should be grouped among those largely responsible for the present condition of many local marshes.

Present Condition:

Thirty-five marshes have been mapped and classified upon the basis of vegetative type. Plant species found in these areas have been listed upon the maps through the use of symbols derived from the scientific names. Sample plots, one ten-thousandth of an acre in size, have been taken at one chain

Date Feb. 26, 1941

No. 20 Twp. Excelsior S. Loc. S.W. 1/4
Pic. No. Area: --- chs. x --- chs. 2.0 Ac.
Type classes B5
Pres. Use None
past Hist. Ground moraine - Kettle type

No grazing, burning or other activity in this area for
The past 20 years. Probably none previous to this period.

Former size About the same as at present.
Use trend Will continue to lie idle as owner thinks it
is more valuable to wildlife

Soil type Carlisle Muck pH 7.0
Vegetation: Dom. *Carex lacustris* Codom.
Assoc. so. *Bc.*, *Cc.*, *Sp.*, *Rl.*, *Vv.*, *Cp.*, *Cs.*, *Apa.*, *Sx.*, *Iv.*, *As.*
Pt., *Sg.*

Food: Quant. 18.38 Qual. 22.00

AV. 28.98
Cover: H. 31.60 D. 32.00 S. 33.00

Concealment: Hor. 78.28 to vert. ---
Surrounding Land: Des. Flat to rolling Ag. and abandoned.

Food: Quant. 28.26 Qual. 33.00
AV. 31.28 Dist. 12 chains

Dist. to Suitable cover 2 ch. to SW, 1 ch. to E.
Grazing: Type and Intensity: Past None

Pres. None
Effects on veg. ---
on game hab. ---

Weather con.: Marsh 6" 40° 38° BH 29° 38° 2" snow - light wind

Surrounding Area 6" 34° 32° BH 29° 32° 2" " "

Imm. past gen. Clear & cold with light wind - snow on ground.

wildlife: observed Pheasant 1, Rabbit 5, Black duck 3,
~~other birds~~ Sora 1, Marsh Hawk 1, Redwings, Song birds on edge

Feces Rabbit, Pheasant (N)

Dens Rabbit 1, R.v. Blackbird nest 1, Black duck nest 3,

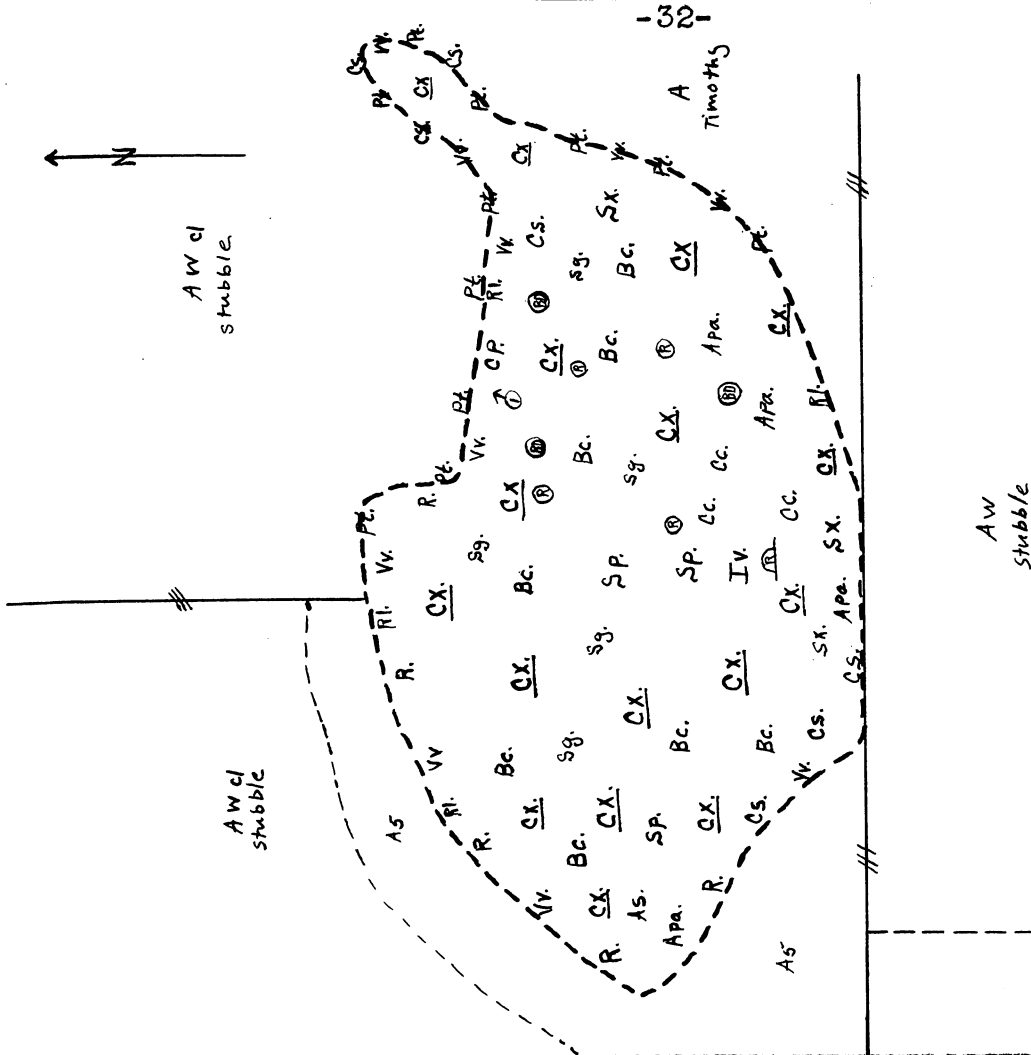
Tracks *F. Squirrels* (edge), Rabbit, Dog, Mice, Pheasant, Opossum (edge)

Other signs Heavy rabbit feeding on raspberries & pheasant
kill on south edge.

Owners value Values it highly but only because of the wildlife.

Notes land posted - Hunting positively prohibited. Went
burn because he don't want to drive the birds out

Mr. Shible reports seeing at least 20 pheasants in this
marsh this winter. Fairly good natural drainage but
flooded during spring - no artificial drainage.



Scale: 1/2 inch = 1 chain

Table 4.

Plants Identified from Marshes of Washtenaw County

<u>Symbol</u>	<u>Scientific Name</u>	<u>Common Name</u>
Aquatics:		
Lm.	Lemna minor L.	Duckweed
Ny.	Nymphaea advena Ait.	Yellow pond lily
Cd.	Castalia odorata (Ait.) W.&W.	Water lily
Ra.	Ranunculus sp.	Buttercup
Pm.	Potamogeton sp.	Pondweed
Sg.	Sagittaria sp.	Arrow-head
Sedges, Rushes, etc.		
Ju.	Juncus effusus L.	Common rush
J.	Juncus tenuis Willd.	Pasture rush
El.	Eleocharis obtusa (Willd.) Schultes.	Spike rush
Ea.	Eleocharis acicularis (L.) R.&S.	Small spike rush
Sa.	Scirpus acutus	Bulrush
Sv.	Scirpus validus Vahl.	Bulrush
Cx.	Carex lacustris Willd.	Sedge
Cl.	Carex lanuginosa Michx.	Sedge
Cu.	Carex lurida Wahl.	Sedge
Cr.	Carex sp.	Sedge
Tl.	Typha latifolia L.	Cat-tail
I.	Iris sp.	Wild flag

<u>Symbol</u>	<u>Scientific Name</u>	<u>Common Name</u>
Grasses:		
Sl.	<i>Setaria lutescens</i> (Weigel) F.T. Hubb	Bristle Grass
Cc.	<i>Calamagrostis canadensis</i> (Michx.)Beauv.	Bluejoint
Ec.	<i>Elymus canadensis</i> L.	Wild Rye
Pa.	<i>Panicum</i> sp.	Panicum
P.	<i>Poa</i> sp.	Blue grass
Pc.	<i>Phragmites communis</i> Trin.	Reed grass
Herbaceous:		
Apa.	<i>Alisma Plantago-aquatica</i> L.	Water plantain
Bc.	<i>Bidens cernua</i> L.	Sticktight
Bd.	<i>Bidens discoidea</i> (T.&G.) Britton.	Bur Marigold
Pp.	<i>Polygonum pennsylvanicum</i> L.	Knotweed
Po.	<i>Polygonum</i> sp.	Smartweed
Vh	<i>Verbena hastata</i> L.	Blue vervain
A.	<i>Aster</i> sp.	Wild aster
S.	<i>Solidago</i> sp.	Goldenrod
Mf.	<i>Monarda fistulosa</i> L.	Wild Bergamot
M.	<i>Monarda</i> sp.	Horse mint
F.	<i>Fragaria virginiana</i> Duchesne.	Strawberry
Mc.	<i>Mentha canadensis</i> L.	Mint
He.	<i>Helianthus</i> sp.	Sunflower
H.	<i>Helianthus</i> sp.	Sunflower
Os.	<i>Onoclea sensibilis</i> L.	Sensitive fern
Ga.	<i>Galium</i> sp.	Bedstraw
E.	<i>Epilobium</i> sp.	Willow herb
Eu.	<i>Eupatorium</i> sp.	Boneset

Herbaceous (cont'd)

<u>Symbol</u>	<u>Scientific Name</u>	<u>Common Name</u>
Ep.	Eupatorium purpureum L.	Joe pye weed
Ct.	Caltha palustris L.	Marsh marigold
V.	Viola sp.	Wild violet
G.	Geum sp.	Avens
Pv.	Prunella vulgaris L.	Heal all
Pr.	Potentilla recta L.	Five-finger
Ps.	Penthorum sedoides L.	Ditch stone crop
To.	Taraxacum officinale Weber.	Common dandelion
Rv.	Rumex verticillatus L.	Swamp dock
As.	Asclepias sp.	Milkweed
Ob.	Oenothera biennis L.	Evening primrose
Ar.	Arenaria serpyllifolia L.	Tyme-leaved sandwort
Ph.	Philadelphus sp.	Mock-orange
Ac.	Apocynum cannabinum L.	Indian hemp
Ca.	Cirsium arvense (L.) Scop.	Canada thistle
Di.	Dipsacus sp.	Teasel
Vb.	Verbascum Blattaria L.	Moth mullein
Vt.	Verbascum Thapsus L.	Common mullein
Dc.	Daucus carota L.	Wild carrot
Nc.	Nept ta cataria L.	Cat-nip
Ug.	Urtica gracilis Ait.	Nettle
Mo.	Melilotus officinalis (L.) Lam.	Sweet clover
Aa.	Ambrosia artemisiifolia L.	Ragweed
Al.	Arctium Lappa L.	Burdock
Ci.	Chicorium intybus L.	Chickory
Xc.	Xanthium canadense Mill.	Cocklebur

<u>Symbol</u>	<u>Scientific Name</u>	<u>Common Name</u>
Shrubs:		
Cp.	<i>Cornus paniculata</i> L'Her.	Panicled Dogwood
Cs.	<i>Cornus stolonifera</i> Michx.	Red-osier Dogwood
Sc.	<i>Sambucus canadensis</i> L.	Elderberry
Sp.	<i>Spiraea alba</i> Du Roi.	Meadow Sweet
Vv.	<i>Vitis vulpina</i> L.	Frost Grape
Rh.	<i>Rhus vernix</i> L.	Poison Sumach
Ro.	<i>Rosa</i> sp.	Rose
R.	<i>Rubus</i> sp.	Raspberry
Rl.	<i>Ribes</i> sp.	Wild Current
Vl.	<i>Viburnum Lentago</i> L.	Nannyberry
C.	<i>Crataegus</i> sp.	Hawthorn
Iv.	<i>Ilex verticillata</i> (L.) Gray.	Winterberry
Co.	<i>Cephalanthus occidentalis</i> L.	Buttonbush
Sx.	<i>Salix</i> sp.	Willow
Pt.	<i>Populus tremuloides</i> Michx.	Aspen

intervals throughout the smaller marshes and at two chain intervals in the larger areas. Data collected in this manner have made possible the determination of dominant and codominant species. The symbol representing the dominant vegetation has been underlined on each of the field sheets. A sample of such a sheet may be seen in Figure 3, while a list of plants identified from marshes has been included in Table 4.

Distinct cover types existing within a marsh have been separated by type lines, while the surrounding areas have been mapped with the use of the ecological classification suggested by Wight (1934). Although this classification was also applied to the thirty-five marshes which were studied, an analysis of vegetative conditions existing upon these and similar areas visited during the course of this work, has made possible the recognition of six general types which in certain cases may be subdivided into at least two phases. A summary of this classification follows:

1. Permanently flooded marshes
 - a. Reed-rush type
 - b. Cat-tail marsh
2. Sedge marsh
3. Sedge-grass type
4. Mixed herbaceous type
5. Herbaceous-shrub-sedge type
 - a. Wet phase
 - b. Dry phase
6. Grass meadow

1 a. Reed-rush type:

Marshes grouped under this type are usually permanently covered by several inches of water and probably occur most frequently adjacent to existing lakes. In such cases the reed-rush marsh appears to represent merely an advanced stage of emergent vegetation. A definite distinction has been made, however, since in the true marsh the fairly dense and more or less continuous plant growth immediately sets it apart from the scattered clumps of emergent vegetation occurring in the shallow portions of the lake itself.

The vegetation of this type is generally characterized by the presence of dense stands of reeds (Phragmites communis Trin.) and bulrushes (Scirpus validus Vahl.) plus scattered clumps or stems of cat-tail (Typha latifolia L.), Scirpus acutus, and Sedge (Carex Spp.). In addition, blue flag (Iris Sp.), Sagittaria, and other truly aquatic plants are often found. Along its lakeward margin the reed-rush marsh often adjoins the preceding ecological type designated as emergent vegetation, while shoreward it usually borders upon a wet sedge area.

1 b. Cat-tail marsh:

Representatives of this type were found to contain water either permanently or at least for a considerable portion of the year. They have been encountered both adjacent to other marsh types in lake basins and in complete possession of small to medium sized depressions in the ground surface.

The dominant species in this type is the common cat-tail. These plants usually occur in dense, pure stands, but

cases may be found in which scattered stems of Carex lacustris Willd. and Scirpus cyperinus (L.) Kunth. plus small bunches of Calamagrostis canadensis (Michx.) Beauv. and Alisma Plantago-aquatica L. comprise a small percent of the total plant cover. The last named species has been found to occur most frequently on small, comparatively bare patches of muck soil instead of being distributed evenly throughout the other vegetation.

Marginal species normally occurring around this type were found to be similar to those encountered in the dryer portions of the sedge marshes and will be described in detail below.

2. Sedge marsh:

Although several variations occur within this type, they were not felt to be sufficiently consistent to warrant a subdivision. In general two species of sedge, Carex lacustris Willd. and Carex lanuginosa Michx., form the dominant vegetation in most of the local marshes belonging to this type. These are accompanied by various other species of Carex and Scirpus as well as a few stems of cat-tail and blue flag.

In the dryer portions these are often accompanied by the common rush (Juncus effusus L.), spike rush (Eleocharis obtusa (Willd.) Schultes.), smartweed (Polygonum spp.), sticktight (Bidens cernua L.), and blue vervain (Verbena hastata L.). Blue flag may also be found in small bunches throughout the area.

3. Sedge-grass type:

This type is generally characterized by the presence of one or more species of sedge plus several grasses among

which bluejoint is usually predominant. Either the sedges or grasses may predominate, but among them they should comprise both the dominant and codominant vegetation.

The sedge-grass marsh is often slightly dryer than the sedge type, but supports, around its edges, many of the marginal species found in the latter case. However, these and other plants among which are aster (Aster sp.), goldenrod (Solidago sp.), wild bergamot (Monarda fistulosa L.), boneset (Eupatorium perfoliatum L.), and mint (Mentha canadensis L.) occur here in more significant quantity.

The important grass species occurring in this type are usually found in small, dense patches which alternate with the areas occupied by the sedges.

4. Mixed herbaceous type:

Marsh areas falling into this class are normally dryer than either the sedge or sedge-grass types. However, small amounts of water are often present for short periods during the spring, and a few exceptions to the previous statement may be found.

These marshes are characterized by a large number of plant species which often grow well distributed over the entire area. Occasional grouping may be found, however, and is apparently the result of local variations in the soil moisture content.

Dominant vegetation in mixed herbaceous marshes varies considerably, but among the species occupying this position, the following appeared to be of most frequent occurrence: sedge (Carex lanuginosa Michx.), bluejoint grass,

sticktight, and goldenrod.

Associated species generally include Carex lacustris Willd., water plantain, common rush, vervain, aster, marsh marigold (Caltha palustris L.), Polygonum sp., mint, heal-all (Prunella vulgaris L.), and bed straw (Galium sp.).

Small clumps of spiraea (Spiraea alba Du Roi.) are often found scattered throughout the area, while along the dryer margins wild bergamot, sunflower (Helianthus spp.), horse mint (Monarda sp.), joe pye weed (Eupatorium purpureum L.) boneset, and raspberry (Rubus sp.) often predominate.

Such shrubs as alder (Alnus incana (L.) Moench.), gray dogwood (Cornus paniculata L'Her.), red-osier dogwood (Cornus stolonifera Michx.), rose (Rosa sp.), hawthorn (Crataegus sp.), and witch hazel (Hamamelis virginiana L.) frequently form an outer border.

5. Herbaceous-shrub-sedge type:

a. Wet phase:

The wet phase of this type appears to represent an invasion of the comparatively wet sedge-grass marsh by a limited number of shrubby species. These shrubs may exist in sufficient quantity to form the codominant vegetation upon the area, but do not show the variety of species which are found in the dry phase.

Elderberry (Sambucus canadensis L.), spiraea, and certain shrubby willows (Salix spp.) are the most important woody plants found in these marshes, although poison sumac (Rhus vernix L.), nannyberry (Viburnum Lentago L.) and winterberry (Ilex verticillata (L.) Gray.) often occur in smaller numbers.

Herbaceous vegetation is largely similar to that previously described for the sedge-grass type in that Carex lacustris Willd., Carex lanuginosa Michx., and bluejoint as well as several species of Scirpus and Polygonum often form an important part.

b. Dry phase:

The dry phase of the herbaceous-shrub-sedge type usually includes a greater variety of both herbaceous and shrubby species than similar, but wetter, marshes. Plant composition is here largely that of the mixed herbaceous type to which have been added such shrubs as spiraea, red-osier and gray dogwood, rose, raspberry, and wild current (Rubus sp.). These may be accompanied by elderberry, nannyberry, and certain species of Crataegus.

This represents the most advanced of the marsh stages, since woody plants will, under normal circumstances, continue to increase upon the area and thus hasten the development of a swamp type.

6. Grass meadow:

The grass meadow is the result of a disturbance of the normal succession. It may be brought about either by burning, draining, and continued grazing of the more advanced marsh stages or through the clearing and draining of swamp areas. Activity of the former type has apparently been responsible for the present condition of marsh No. 31.

Moderate amounts of moisture are usually found in these marshes with vegetative cover being predominated over by sod forming grasses, particularly blue grass (Poa sp.). Other

vegetation commonly occurring on areas of this type are dandelion (Taraxacum officinale Weber.), Canada thistle (Cirsium arvense (L.) Scop.), and common mullein (Verbascum Thapsus L.) with small clumps of Carex spp. and bluejoint occurring in the wetter parts.

Ecological Trend:

Although moderate drainage and occasional burning appear to have opened up many wet marshes to a greater variety of herbaceous plants, the subsequent or continued use of these areas, principally for the pasturing of livestock, seems to have retarded their rate of development.

With the exception of the comparatively small marsh area which has been put into crop production, very few of the local types appear to have sustained any real set back and, consequently, would probably pass normally into the higher successional stages should activity upon them be eliminated. On the other hand, the increased use now being made of marshes seems to indicate that, taken as a whole, changes in the present condition will be much more gradual than would normally be expected. In addition, a complete realization of the value of marshes to wildlife may result in an organized attempt to insure the maintenance of sufficient habitats of this type to meet the requirements of the game populations of Southern Michigan.

USE BY WILDLIFE

Method of Study:

The study of the type and intensity of use made of marsh lands by wildlife was carried out through direct observations upon the various species, plus a careful analysis of all animal signs which could be located in the area. Data of this type were collected both at the time of mapping and on subsequent visits to the marshes.

The above mentioned data were supplemented by the results of a bird dog census taken in eight of the marshes studied.

Wildlife records supplied by rural land owners have been included in the field notes, but have not been used except where the information has been varified.

Field investigations were carried on principally during the winter of 1939-40 and throughout the spring of 1941. Good tracking snows which occurred frequently during the former period enabled the writer to obtain much information upon the activity of the various animals using the marshes.

An appraisal has been made of the food and cover provided by each of the 35 marshes during the winter months. Since this phase of the work concerned itself principally with a comparison of conditions existing on grazed and idle marshes, details of the method used in arriving at the different

numerical values are presented along with a summary of the results under the heading "Effects of Grazing". However, certain information collected during the survey was found to fit logically into the following discussion, and consequently, will be presented below.

Since in this investigation particular attention has been given to the ring-necked pheasant, all evaluations of food and cover conditions have been based principally upon the requirements of this upland game species.

Upland Game Birds:

Both the ring-necked pheasant and the bob-white quail make use of the local marsh lands. Pheasants were flushed from 26 marshes, while definite signs of their presence were evident in 4 others. Thus a total of 30 areas comprising 85.71 % of the group studied were used by this species.

Pheasants begin to make use of marshes during the fall when all crops have been harvested and when native upland vegetation is commencing to provide insufficient cover. They remain in these areas throughout the winter, leaving only to feed along nearby fence rows and in adjoining fields. With the coming of spring, however, these birds seem to prefer the agricultural or abandoned uplands, and usually leave the marshes before flooding makes the latter areas uninhabitable.

Although pheasant nests are occasionally found in some of the dryer marshes, records of this type constitute exceptions to the general rule.

Spooner (1939), while testing the method adopted by

Table 5.



Figure 4.

Pheasant Nest in a Sedge Marsh

Photograph by Julien Griggs

this author for comparing food and cover conditions for pheasants on grazed and ungrazed areas, arrived at the following comparative values for cover and concealment on different vegetative types:

Table 5.

Grazed Areas

	Oak Hickory	Sweet Clover	Mixed Herbaceous	Marsh
Mean				
Cover Value	19.28	45.60	35.24	55.80
Mean				
Concealment	23.68	30.02	5.25	31.24
Value				

Ungrazed Areas

Mean				
Cover Value	42.66	46.72	60.08	86.38
Mean				
Concealment	45.58	49.46	58.90	79.06
Value				

These figures represent the arithmetic mean of values assigned to vegetative concealment and to height, density, and stability of cover. They constitute the result of measurements made on a series of random sample plots taken throughout the areas. Details of this procedure are discussed on page 68.

As has been shown in Table 5, marshes ordinarily provide more desirable cover and more complete concealment than other possible winter roosting sites. In order to evaluate one phase of the protection afforded wildlife by this vegetation, a series of temperature readings have been made both in marshes and on adjoining upland areas. All general weather conditions

were kept as similar as possible while any particular series of readings was being made. Likewise, the time between the taking of comparative marsh and upland temperatures was limited to that required for the worker to move from one location to the other.

Data obtained during particularly cold weather have been separated from those secured on milder days. Temperature readings falling into the former group have shown the marshes to be an average of 8.0 fahrenheit degrees warmer at six inches above the ground surface than nearby uplands, while those of the latter group averaged 4.2 degrees warmer at a similar elevation. Comparisons of breast height temperatures have also shown marshes to be the warmer of the two habitats, but here by an average of 5.3 degrees during cold weather and 2.3 degrees under milder conditions.

Wight (unpublished manuscript) has found an average temperature difference even greater than the 8.0 degrees mentioned above. It should be mentioned, however, that in the former work a maximum-minimum thermometer was employed, while during the present investigation a field thermometer of the ordinary type has been used.

The same author has also pointed out that while temperature is probably an important factor in holding pheasants in the marshes throughout the winter, it is evidently not the prime consideration, since birds begin to move into these areas during the fall before periods of bad weather would warrant their use.

During this investigation an attempt has been made to

determine whether or not a correlation existed between the number of pheasants using a marsh and the local food and cover conditions. In view of the fact that very little food can be found in marshes, and since it is generally conceded that the value of any particular area is more or less predicated upon conditions existing on surrounding lands, a general survey was made of the quantity, quality, and availability of grains and wild seeds located within a reasonable distance of the marsh. This survey followed a procedure similar to that used in the marsh itself, thus comparable results were obtained.

The correlation study has confined itself to eight marshes for which it was felt that complete and accurate pheasant use data had been obtained. Each of these areas had been carefully censused with the use of a bird dog.

Results have shown that very little correlation exists between the size of the pheasant population wintering in a marsh and any one particular factor such as marsh food, marsh cover, or adjacent upland food.

On the other hand, when marsh food and cover figures were combined, and an average value secured, this value showed a coefficient of correlation of .58 when compared with the pheasant population data. It was also determined that if the above mentioned value represented an average which, in addition to the two marsh factors, included adjacent upland food, a correlation coefficient of .74 was obtained.

Data from which these coefficients were derived are presented in Table 6. In this table the figures found in column 3 represent the average of values assigned to quantity,

quality, and availability of marsh food, and height, density, and stability of marsh cover; while those in column 4 have, in addition, included ratings of adjacent upland food. Details of the method used in obtaining all values are described on page 68.

Table 6.

Pheasant Use

:Marsh:	Birds	:Average Value	Marsh:	Average Value
: No. :	Per Acre:	Food and Cover	:and Cover	Marsh Food
:	:	:	:	and Upland Food:
: 18 :	2.09 :	74.39	:	80.11 :
: 13 :	1.41 :	73.46	:	81.97 :
: 15 :	.90 :	77.34	:	79.23 :
: 30 :	.71 :	70.60	:	76.40 :
: 12 :	.64 :	77.80	:	77.54 :
: 26 :	.63 :	42.67	:	59.13 :
: 8 :	.24 :	54.79	:	62.19 :
: 34 :	.04 :	50.30	:	55.20 :

In view of these facts, it seems obvious that a definite interrelationship exists between pheasant population movements and the three environmental factors named above. It is also apparent that, while marshes may provide excellent winter roosting sites, the extent to which such areas are used by pheasants is in a measure determined by the quantity, quality, and availability of food located upon the surrounding uplands.

If reliable conclusions are to be drawn from data such as those described above, several facts should be kept in mind. In the first place, it is desirable to compare only those areas which are located in regions of similar pheasant population density. This has been attempted in the present work, but a closer grouping of the marshes from which data were

obtained might possibly have resulted in a better correlation.

Secondly, it is difficult to obtain an accurate evaluation of food conditions on surrounding uplands, since pheasants will frequently travel over the better part of a section to secure desirable food. During this investigation the writer has attempted to determine from the local land owners the location of probable feeding areas. Particular attention was then given to these before the general food survey was made.

It has been mentioned above that five of the marshes studied were apparently not used by pheasants. Several possible reasons for this condition were evident. Marsh No. 3 was largely frozen over throughout the winter and contained considerable water during both the spring and fall. Numbers 31 and 32 provided practically no cover, the former being heavily grazed and the latter having been cut for marsh hay.

No particular fault could be found with the two remaining areas. However, it seems probable that as roosting sites they were inferior to other similar vegetative types located in the vicinity. This inferiority may have been due to poor cover conditions or to an undesirable location of the marsh with respect to feeding grounds.

Quail apparently make less use of marshes than do pheasants, but it should be remembered that the bob-white is not so numerous in this section as is the latter species. Quail were flushed from four marshes while definite signs of their presence occurred in two others.

These birds appear to show little preference for

any particular vegetative type so long as suitable cover is provided. Coveys were flushed from the center of marshes during the colder periods of the winter, but unless forced to seek the maximum protection provided by the vegetation within these areas, this species seemed to prefer the dryer conditions existing along the edges.

Occasional records of marshes being used as nesting sites by this species can also be found, but on the whole, the agricultural or abandoned upland areas appear to provide the more suitable spring and summer habitat. Consequently, the use of marshes by quail during this period would be more or less exceptional.

Waterfowl:

The presence of waterfowl was noted on several different occasions in ten of the 35 marshes which were studied. The majority of these records were obtained during the spring migration, although a few ducks had been seen in the fall of 1939 and several black ducks remained to nest in marshes No.15 and 20 in April of 1941.

On the whole, waterfowl make use of the small ponds or streams which are often associated with marshy areas, and the presence of at least small amounts of water can be considered almost a prerequisite to use by these species. Three of the 10 marshes mentioned above included ponds, one was crossed by a small stream, and the remaining six, although largely covered by sedges, cat-tails, and a few shrubs, contained as much as two feet of water following the spring thaw.

Black ducks, mallards, and lesser scaup were encountered most frequently and in the greatest numbers. These were followed in order by baldpate, blue-winged teal, pintail, American merganser, and ring-necked.

Fur Bearers:

Mammals comprising this group consisted of the muskrat, skunk, weasel, mink, and raccoon. On the basis of data collected, the muskrat appeared to be the most frequent user. This species occurred in ten marshes and was followed by the other animals in the order in which they have been named above. Direct observations, however, were limited to one each upon the muskrat and the mink, with the remaining data being derived from such signs as feces, tracks, and dens. Consequently, the extent of use by the majority of these species has probably been underestimated.

The following table presents a summary of the muskrat data collected during this work:

Table 7.

Muskrat Use

:Marsh:	Vegetative	:Area :	No. :	Est. :
: No. :	Type	:	:Houses:	Population:
: 3 :	Cat-tail	: 2.8:	1 :	3 :
: 4 :	Cat-tail	: 3.9:	4 :	12 :
: 5 :	Sedge-grass	: 9.6:	1 :	3 :
: 12 :	Herbaceous-shrub-sedge	104.6:	6 :	18 :
: 14 :	Sedge	: 7.6:	6 :	18 :
: 15 :	Herbaceous-shrub-sedge	35.5:	6 :	18 :
: 16 :	Sedge	:206.7:	1 :	3 :
: 23 :	Sedge	: 14.8:	1 :	3 :
: 30 :	Cat-tail	: 14.0:	2 :	6 :
: 34 :	Sedge	: 71.0:	1 :	3 :

Estimated populations have been based upon an assumed average of 3 rats per house.

Muskrats were found to occur in practically all marshes in which suitable water conditions and vegetation existed, but since populations were generally small, the trapping of any one particular area would have been impracticable unless other trap sets could be made in the vicinity.

It is evident that the one house located in marsh No. 23 was constructed between April 26 and May 7, 1941, since its proximity to the point at which this area was invariably entered by the writer eliminated all possibility of it being a reconstruction of an old house.

Skunk signs noted in 7 of the 35 marshes consisted largely of tracks and feces. The latter were found in greatest abundance during the fall of 1939 and, in addition to other material, included the remains of a number of crayfish which may possibly have been obtained along the drainage ditches.

In two instances skunk dens were found in dry locations along marsh edges, but even here tracks indicated that these animals made comparatively little use of the marsh itself. A third den was located in the swamp type adjacent to marsh No. 1, but no indications that its occupant was using the marsh proper could be found. Thus skunks may occasionally wander into marshes during the course of their travels, but apparently do not spend a high percent of their time in such a habitat.

Weasel and mink probably range over a large number

of Southern Michigan marshes, but their signs were noted in only a small percent of the 35 studied. Weasel signs occurred in four marshes while those of mink were limited to three.

Marsh No. 11 was repeatedly crossed by a weasel whose den was located some 25 chains away in a ditch bank. This animal apparently hunted in the vicinity of the marsh, since its tracks were noted throughout the entire winter of 1939-40. As far as could be determined, however, this individual showed no particular partiality toward the marsh habitat.

Mink signs, although almost lacking throughout the winter, were found in greater numbers with the coming of spring. Records of this type occurred on marshes No. 12, 23, and 34, with the only direct observation being made in May 1940 upon an animal which swam the small creek in marsh No. 12. Two mink dens were also found in this marsh, both being located along the creek bank.

In general, mink appeared to make most use of marshy areas during the warmer periods of the year. Consequently, this investigation, which of necessity was limited to winter conditions, has probably underestimated the value of such a habitat to this species.

Opossum signs consisted solely of tracks encountered around the edges of marshes No. 13, 14, and 20. In each case, these areas were bordered by considerable shrubby vegetation, and it was through this that the opossum had traveled. No signs of this animal were found in the interior of any of the marshes studied.

Since marshes No. 13 and 14 are separated by a

distance of only 6 chains, a single animal may well have been responsible for all signs occurring on both areas. This particular animal was tracked and located in a woodlot some 20 chains from marsh No. 14.

Game Mammals:

Cotton-tail rabbits were seen in 15 of the marshes studied, while definite signs of their presence were recorded on 13 others. This total of 28 marshes, representing 80 % of the sample group, is second only to the 85.71 % found to be used by the ring-necked pheasant.

As in the case of the pheasant, rabbits apparently derive their greatest benefit from the cover and concealment afforded by marsh vegetation throughout the winter. Evidences of the feeding of these animals have been noted upon such plant species as raspberry, rose, red-osier and gray dogwood, spiraea, and willow. However, as the majority of these species are found in greatest abundance along marsh edges, it seems likely that rabbits, although spending much of their time in marshes, carry on their feeding activities upon the surrounding upland areas.

These animals evidently leave the marshes during the spring when vegetation on the upland types begins to provide suitable concealment and the presence of water in the marshes makes the latter areas practically uninhabitable for this species.

Raccoon signs were encountered in but a single marsh. This area, No. 26. contained several overmature elms in the northeast corner, and it was in this part that several feces

were collected.

Although raccoons, in this locality, are relatively less active during the winter than most of the other animals studied, it is felt that this species would confine its movement largely to wooded areas, particularly river swamps, and consequently would make little use of marsh lands.

Tracks of the fox squirrel were found along the dryer margins of three marshes and crossing into the swamp type surrounded by marsh No. 35. In all cases these tracks could be traced to nearby trees. Activity of squirrels within marshes is purely accidental, since this is not a species which would be expected to make use of the typical marsh habitat.

Additional Wildlife:

Among the other species of wildlife which are frequently encountered in Michigan marshes, particularly during the summer months, are the pied-billed grebe, great blue heron, American bittern, sora rail, marsh hawk, red-winged blackbird, and short-billed marsh wren. All of these species, with the exception of the great blue heron, nest in the herbaceous vegetation of the local marshes.

In addition, the meadow mouse (Microtus pennsylvanicus), and several species of Peromyscus were found. These animals occurred in greatest numbers in the dryer sedge-grass types, particularly under matted vegetation.

USE BY MAN

The various types of local marsh use have apparently undergone a considerable change during the last 50 years. The cutting of marsh hay has, in many instances, been replaced by the harvesting of upland forage crops. More extensive upland cultivation has increased the importance of the marsh as a potential pasture. Many of the organic soil deposits have been cleared and drained with the result that crop production is now being attempted upon areas formerly occupied by marsh vegetation. Finally, increased hunting pressure has lead to an ever greater use of marsh lands by the general public, while many wildlife sanctuaries have been located in such a way as to include portions of this important type of game habitat.

During this investigation, six different types of marsh use have been encountered. These can be listed as follows:

1. Wildlife Sanctuary
2. Hunting Area
3. Trapping Area
4. Marsh Hay Production
5. Pasture and Stock Watering Area
6. Crop Production

Wildlife Sanctuary:

The true wildlife sanctuary must, under the present conservation laws, be voluntarily dedicated to this purpose by the land owner, approved and accepted by the State Conservation Department, and posted and protected against violators. Dedications must be made for not less than five years on areas which can be from 20 to 1500 acres in size.

Although only one such area was included within the sample group, Wight (1928) has indicated that marsh lands predominate among the various types of privately-owned state game refuges of Michigan. Marsh No. 12 was found to have been put to this use by its owner.

Hunting Area:

Approximately 74 % of the marshes studied were used by hunters during the seasons of 1939 and 1940. No remuneration was received for hunting privileges on any of these areas, but the owner of Nos. 13 and 14 was considering removing hunting restrictions and charging a small fee for the use of these marshes during a coming season.

Although 8 of the hunted marshes were unposted, all owners felt that permission to make use of their areas for any purpose should be requested.

Very little reliable information was obtainable upon either game kill or hunting pressure, since comparatively few marsh owners had made any effort to remember or record data of this type. It is apparent, however, that the majority of individuals comprising the pheasant hunters

come from such urban areas as Ann Arbor or Detroit, while rural residents often predominate among the rabbit hunting group.

Marshes No. 16, 25, and 34 are said to have provided a little duck shooting during the past few years, however, the principal attraction of these areas to waterfowl is probably the open water of the lakes around which they are situated.

Trapping Area:

Muskrats were found in 10 of the thirty-five marshes which were studied, but traps had been set only in area No. 4. This marsh had an estimated population of 12 rats, but as the trapping had not been done by the owner, it was impossible to determine the total number removed during the past season.

Rural land owners seemed to take little interest in the trapping possibilities of their marshes. This condition may be due to the fact that, while many of the marshes contain the occupants of one or two muskrat houses, very few support a sufficient population to make trapping economically justifiable.

Muskrats were the only species trapped on any of the marshes studied.

Marsh Hay Production:

Marsh hay consists of the harvested portions of sedges, rushes, and grasses growing in a marsh. In the

past, large quantities of this material were mowed and fed to livestock, but under present agricultural conditions it has been largely replaced by more nutritious types of fodder. Small amounts of marsh hay are still cut, however, from a number of the local marshes, but it appears that much of the present harvest is used for purposes other than animal fodder.

Hay was harvested during the fall of 1940 on three of the thirty-five marshes studied. Information obtained from the owners of these and other similarly used areas indicated that the average cut varies between 1 and 1½ tons per acre depending upon its plant composition. Practically pure stands of broad-leafed sedges such as Carex lacustris Willd. yield maximum weights, while mixtures including grasses and narrow-leafed sedges return less per acre.

Although some of this hay is still used as fodder, large quantities of it are sold for packing material. In cases of the latter type, the sale price ranges from \$6.00 to \$7.00 per ton with an average net value to the farmer of approximately \$4.00.

Small cuttings of marsh hay are occasionally made to provide material for use in covering stacks of timothy, clover, or alfalfa hay while these are standing in the field. Other similar uses include the substitution of the dried marsh plants in various circumstances otherwise requiring the use of straw. Uses of this type were responsible for the mowing of a portion of marsh No. 24 in

the fall of 1940.

As has been mentioned above, a number of the local farmers still use marsh hay in the winter feeding of cattle, sheep, and horses. Mr. N.R. Ellis, in a personal letter to the author, has mentioned that this material is usually inferior in feeding value to hay from upland pastures, but points out that a great deal depends upon its plant composition, the period of cutting, and the manner of curing.

Kedzie (1889) has stated that, in general, "the coarse, broad leafed sedges which are covered with a sharp silicious crust when ripe, make very inferior hay, but fine sedges made into hay before hardening and ripening will make a much better fodder".

An analysis by the Michigan Agricultural Experiment Station (1889) of marsh hay cut near Paw Paw, Michigan has given the following results:

Composition of Marsh Hay

Water, Percent	7.86
Ash, "	4.20
Crude Fiber "	27.55
Albuminoids "	7.00
Ether Extract - Fat	3.60
Nitrogen Free Extract - Carbohydrates	49.97
	<u>100.00</u> %

Similar analyses, presented in the annual report of the Michigan Agricultural Experiment Station for 1889, have shown the composition of the average timothy hay to

be as follows:

Composition of Timothy Hay

Water, Percent	10.21
Ash, "	4.19
Crude Fiber, "	30.35
Albuminoids, "	6.15
Ether Extract - Fats	2.12
Nitrogen Free Extract - Carbohydrates	46.98
	<hr/>
	100.00 %

From these figures it can be easily seen that the better grades of marsh hay compare very favorably with the average cuts of timothy hay. It also appears likely that chemical composition indicates for marsh hay a higher feeding value than is usually assumed.

Pasture:

Pasturing constitutes the most extensive farm use of local marshes. Approximately 68 % of the total number studied and 88.93 % of their combined area was found to be grazed. Data collected from cover maps of portions of eleven townships and presented in Table No. 8, although averaging slightly less than the above figures, substantiate the importance of this use.

Several reasons for the pasturing of marshes have been advanced by the local farmers. Principal among these is the fact that marshes frequently provide the only source of water for livestock on permanently pastured areas. Thus

Table No. 8

Extent of Marsh Use

Township	Number of Sections Planimetered	Total Marsh Acreage	Percent of Marsh Area Pastured	Percent of Marsh Area Idle	Percent of Marsh Area Cultivated
Ann Arbor	36	445.48	86.24	10.77	2.99
Dexter	36	1360.90	83.57	12.52	3.91
Freedom	24	937.40	78.66	11.15	10.19
Lima	18	1843.49	70.35	27.28	2.37
Lodi	30	209.00	75.69	15.50	8.81
Lyndon	24	1328.50	71.81	26.42	1.77
Northfield	29	937.53	55.19	30.79	14.02
Scio	36	833.60	88.62	6.43	4.95
Sharon	18	1449.78	56.73	27.32	15.95
Sylvan	24	1556.60	59.19	40.51	0.30
Webster	36	1449.14	67.67	30.71	1.62
Average Township	28.2	1122.86	72.39	21.53	6.08

their importance is increased considerably above that which might be expected from a mere study of the comparative acreages of marsh and upland pasture.

In addition, certain farmers, such as the owner of marsh No. 31, feel that very good pasture is provided in these areas, while a few others are apparently forced to make use of marshes because of a lack of upland pasture. The latter was found to be true in the case of marsh No. 33. Between these two extremes lies the practice of turning livestock into the marshes during the spring and holding them in such locations only until fields of upland forage crops are ready for pasturing.

Several marshes were encountered on which the grazing rights were leased. These had been taken up largely by neighboring farmers who were in need of additional pasture. The lessees had apparently acquired the use of these marshes principally because they were well suited to grazing, but additional attractions could be found in the fact that rent was slightly less than that asked for upland pasture while the proximity of the marsh often reduced the work necessary to the transferring of livestock.

In order to bring best returns, rented marshes should be properly drained, provide a readily available water supply, and include an acreage of surrounding upland pasture equal to at least 25 % of that of the marsh. In such cases rents might be expected to average about \$1.00 per month per head of cattle and \$0.25 per month per sheep.

No plantings of forage crops were found within the group of marshes comprising the random sample, however, certain plants such as timothy, reed canary grass, and alsike clover are occasionally used in this vicinity. Two such marshes were visited and in both cases results were found to be largely satisfactory. In each case these plantings had followed unsuccessful attempts to cultivate.

Osvald (1920) has presented material collected on the use of clover and grass mixtures for meadow purposes in Sweden. Productive capacity is said to have been maintained during the eight years in which the study was made. Clouston (1932) has likewise reported complete success in the conversion of a "Scirpus peat area" to high grade pasture in Scotland. This marsh was drained, limed, and fertilized, then seeded to mixtures of meadow grasses, wild white clover, timothy, orchard grass, and alsike clover.

In view of the many successful marsh pasture improvement projects which can be found both in this and in other countries, it seems probable that the value of many of the local pastured marshes could be considerably increased through careful management and forage crop production.

The majority of the idle marshes of Washtenaw County are apparently remaining in this condition for one or more of the following reasons: (1) insufficient drainage, (2) poor location with respect to other pasture, or (3) sufficient upland to provide for all grazing needs.

Effects upon Vegetation:

The effects of grazing upon marsh vegetation were found to vary with the grazing pressure and with the particular kind of livestock using the area. Although grazing pressure has been calculated, for comparative purposes, upon the basis of cow equivalent units, it should be mentioned that sheep do the least apparent damage to marshes.

Areas used only for sheep pasture show comparatively little trampling of vegetation and usually only slight grazing of sedges and other similar species. Sheep are apparently more selective in their feeding than cattle or horses, since the latter animals were found to utilize large quantities of practically all plants occurring in a marsh in which they were pastured. The large hooved animals appeared also to be responsible for the majority of trampling of vegetation frequently noticeable in marsh pastures. Cattle, sheep, and horses seemed to graze freely over mixed herbaceous and herbaceous-shrub-sedge types.

Grazing pressure on the marshes studied was found to range from .69 to 19.8 acres per cow equivalent unit. Although on the average these areas showed effects of pasturing proportionate to their grazing pressure, certain exceptions to this condition could be found. These were apparently due to the variations in animal use mentioned in the preceding paragraph.

In addition to these obvious effects, certain plant species suited to the moist conditions within the marsh, but long associated with heavy grazing, can often be found invading the area. Weaver and Clements (1938) have mentioned Polygonum, Lepideum, vervain, aster, goldenrod, and ragweed as members of this group. In addition to these species, certain others appear to become abundant in local pastured marshes. This latter group consists largely of common mullein, Canada thistle, teasel, and milkweed. These frequently occur in greatest quantity in the dryer portions of the marsh where grazing and trampling are usually most noticeable.

Effects upon Wildlife Habitat:

The effects of pasturing upon the wildlife habitat have been studied through the use of a method generally similar to that suggested by Wight (1932) and used by Trippensee (1934) and Spooner (1939). This system involves the use of a series of random sample plots located at one chain intervals on which measurements are made of food, cover, and concealment. The latter factor has been calculated upon a percent basis, while the other two^{were} assigned a total score of 99 each. Food and cover were subdivided into three categories, each receiving a maximum value of 33.

Food Measurement:

Food measurements consisted of determining the value to be assigned to the three subdivisions, quantity, quality, and availability on each of the sample plots. Quantity was



Figure 5.

Heavily Grazed Marsh (No.1)



Figure 6.

Ungrazed Marsh (No.20)

classified and rated as follows:

Class	Value
Abundant	33
Medium Amount	22
Small Quantity	11
Absent	0

Quality was determined by the relative value placed upon species occurring in the sample plots by Dalke (1934) and through reference to the material included in the list of marsh plants reportedly used for food by the ring-necked pheasant. This list, taken principally from Fassett (1940), has been included in the appendix of this report.

Quality has been scored as follows:

Class	Value
Principal Food	33
Frequently Eaten (medium value)	22
Regularly Eaten (low value)	11
Occasionally Eaten (low value)	0

Availability was affected by such factors as the time of year in which seeds or fruits mature, as well as the presence of snow, water, or matted vegetation covering the food supply. Class scores were as follows:

Class	Value
Good Availability	33
Medium "	22
Low "	11
Inaccessible	0

Cover Measurement:

Cover measurement involved the scoring of height, density, and stability. Heights were rated as follows:

Class	Value
0 - 5 inches	0
5 - 12 "	11
12 - 18 "	22
18 inches and over	33

In each case a steel tape was used to measure the vegetation and an attempt was made to determine the average height of that growing on the plot. This average figure was then used in determining the value to be assigned to this factor on any particular plot.

Density was calculated upon the basis of number of stems of vegetation growing within the wire quadrat. Quadrats were constructed 2.08 inches on a side so as to include one ten-thousandth of an acre and all stalks growing within this area were counted. Counts were made at an elevation of 6 inches above the ground. This factor was scored as follows:

Class	Value
1 - 5 stems	0
6 - 10 "	5
11 - 50 "	9
51 - 100 "	12
101 - 150 "	15
151 - 200 "	22
200 and over	33

Stability of vegetation was estimated upon the apparent ability of different plants to stand up throughout the winter and thus provide cover and concealment for animal life. It has been subdivided into the following classes:

Class	Value	Example
Valueless	0	Bluegrass
Poor	11	Marsh grasses
Good	22	Broad-leaved herbaceous plants
Excellent	33	Broad-leaved sedges, Shrubby plants

Concealment was measured with a visibility board which enabled the writer to determine the relative ability of vegetation to conceal an object. This board was constructed and used in a manner similar to that suggested by Wight (1938). Spooner (1939) also used this type of board and demonstrated its value.

In this investigation, the board employed measured 18 x 9 inches. This board was painted white and had its surface divided into 16 squares measuring 3 x 3 inches each. Squares were numbered consecutively beginning in the upper right hand corner. While in use, the board was held in position by means of a metal spike extending from its lower edge. This spike was pushed into the ground until the edge of the board rested on the ground surface.

The board was placed in position in each of the sample plots and readings were made from a point two-thirds of a chain or 44 feet back along the transect line. These readings consisted merely of recording those numbers which were clearly visible through the vegetation. Such a record

made possible the determination of percent concealment.



Figure No. 7

Winter Conditions in a Heavily Grazed Marsh

Results:

After the completion of the field evaluation, data were brought into the office and an average figure determined for each of the various factors mentioned above. These figures have been recorded upon the field sheet used on each marsh.

Further work has separated the 24 pastured marshes into 3 groups, divisions being based upon local grazing pressure. Group ranges are as follows:

Group 1 - 0.69 - 1.50 acres per cow equivalent

Group 2 - 1.51 - 5.00 acres per cow equivalent

Group 3 - 5.01 -19.84 " " " "

The values assigned to food, cover, and concealment in each of these areas were thus automatically separated into three groups. A grand average was then computed for each factor in each of the three pressure classes. Similar work was also done on all of the un-pastured marshes and average figures were again determined. These have made possible the following comparison of food, cover, and concealment conditions on pastured and un-pastured marshes:

Table No. 9.

	Food			Cover			Concealment
	Quant	Qual.	Avail	Ht.	Dens.	Stab.	Percent
Heavy							
Grazing	10.69	15.12	13.42	14.81	29.42	16.15	49.43
Pressure:							
Medium							
Grazing	11.16	13.75	14.30	17.16	29.53	18.37	52.02
Pressure:							
Light							
Grazing	10.64	15.12	14.25	16.99	29.06	21.68	54.36
Pressure:							
Un-							
Pastured	14.09	16.50	19.95	30.15	30.69	28.84	88.17

Un-pastured marshes were found, on the average, to provide a better wildlife habitat than those which were grazed by livestock. However, since all evaluations of food and cover have been based principally upon the requirements of the ring-necked pheasant, exceptionally poor drainage in a completely idle marsh will often necessitate an evaluation

of the area which is lower than that assigned to the poorest of the grazed marshes.

Grazing pressure was found to have practically no relation to quality of food or density of cover, but appeared to be directly correlated with stability of cover and percent of concealment.

Quantity and availability of food as well as height of cover varied only slightly among the pastured groups, but showed noticeable improvement in ungrazed areas.

A final analysis of wildlife conditions on pastured marshes plus a realization of the local importance of this type of use seems to indicate that damage done by grazing to marsh vegetation is not sufficient to warrant any concerted attempt to exclude livestock from these areas. It seems desirable, however, that grazing be limited to light or medium pressure in order to provide at least 50 % concealment with dense vegetation having satisfactory height and moderately good stability.

It also seems probable that complete idleness would preclude the possibility of installing many desirable drainage projects which are justifiable because of pasturing.

Cultivation:

Although many tracts of cultivated marsh soil were encountered during this investigation, they were generally small and consisted of only a portion of a larger marsh area. Consequently, as shown by table No. 7, these local tracts represent only a small percent of the county's total marsh

area, and on the whole do not attain the size of the large onion, mint, and celery lands found in other parts of Southern Michigan.

Crop production was included among the uses of 4 of the 35 marshes studied, with marsh No. 1 showing the largest percent of land under cultivation. Here 9.06 acres, representing 24.80 % of the total area, had been plowed and planted to corn in both 1939 and 1940. This constituted a second attempt at cultivation, since a similar effort had failed approximately 10 years before. Insufficient drainage had apparently been responsible for this failure, and the present attempt was being made only after a deepening of the ditch had noticeably improved moisture conditions within the marsh.

Grain or truck crops can be produced satisfactorily on local organic soils as was shown by results obtained on marshes No. 7 and 22, but unless particular attention is given to the specific drainage and soil requirements of an area, yields are likely to be doubtful. The latter condition existed in a portion of marsh No. 26.

Many other instances of cultivation were found in the group of several hundred marshes which were visited by the writer. These areas showed varying degrees of success, as well as a number of complete failures. In many of the latter instances native marsh plants had been allowed to again take over the area, while in a few cases, plantings of canary grass, timothy, or alsike clover had been made preparatory to returning the land to pasture.

Dachnowski (1926) has stressed the necessity of a careful analysis of local conditions as a prerequisite to the satisfactory reclamation of any marsh, while Veatch (1930) has emphasized correct fertilization as another factor essential to good crop production on such areas. Any doubt regarding the correctness of such statements can be easily removed through a study of local conditions, since these factors operating either singly or together have apparently been the principal causes of failure among recent cultivation efforts.

In view of the above facts, a question must necessarily arise as to the advisability of attempting crop production on the local marsh lands. No generalized answer to this question appears possible, since all decisions upon such action must apply to individual areas and should be made only after a careful consideration of (1) the crop production possibilities of the soil type involved, (2) the expense of draining the marsh, and (3) the annual expenditure required to maintain maximum yield. These should be weighed against the probable crop yield per acre plus the local demand or market for the product, in order to determine whether or not cultivation of the marsh would be economically justifiable.

Veatch (1930), in his discussion of the agricultural value of the soils of Washtenaw County, has stated that although any of the local organic types may, under proper management, be made to produce agricultural crops, certain inherent qualities peculiar to each different type usually

modify the possibilities of their use for this purpose. Additional and more specific information presented by the same author has been used to form the majority of the following discussion of the qualifications of each of the marsh soil types for agricultural usage.

Organic soils are generally rich in nitrogen and low in potassium and phosphorus. The last two elements often occur in greatest quantity in the muck types, but even here the supply is usually insufficient. This is substantiated by the fact that Whitson and Ullsperger (1920) have named potash as the principal factor which limits crop yields on peat or muck lands.

Local organic deposits have been rated from high to low on the basis of fertility, but are given a rank of second or third class for general farming.

Kerston muck, although having a medium to high fertility rating, is seldom used for agricultural purposes. This type is usually difficult to drain properly and occurs in long, narrow strips in the flood plains of many of the larger streams. No cultivation of Kerston muck could be located by the writer, but truck crops can be grown successfully in certain locations. Fertilizers which are rich in potash should be used wherever crop production is attempted.

Carlisle muck is probably the most desirable of the local organic soils from the standpoint of agriculture. On the whole, this type presents the least drainage difficulties and requires a lower reclamation cost than any of the other members of the organic group. The ability to properly

control the height of the water table is essential, while generous applications of commercial fertilizers having a high percentage of potash are usually necessary if maximum yields are to be received.

When properly managed, Carlisle muck is particularly suited to the production of such crops as celery, onions, cabbage, carrots, and mint, but it may also be successfully planted to grains.

Neither Carlisle muck or Kerston muck require liming, but compacting the surface layers with the use of a roller seems advisable.

Houghton muck, which constitutes 1.1 % of the county's soil surface, is characterized by the presence of an extremely high water table, thus necessitating careful planning of drainage projects. This type rates from low to medium in fertility and has a rank of third class for general farming. It may or may not require liming depending upon the acidity of the particular area involved, but applications of potash are essential to crop production.

Although Houghton muck has been known to be used successfully in the production of truck crops, it is generally unsuited to agriculture. Pasture or marsh hay have been suggested as possible uses.

Rifle peat has a medium to low fertility value and a rank of third class for general farming. This type constitutes 3.0 % of the county's land surface and in this respect is second only to Carlisle muck, the latter

representing 7.3 %.

Comparatively few attempts have been made to cultivate this soil, although areas of a similar type have been known to produce truck crops in other sections.

Rifle peat requires applications of lime which vary from 2 to 12 tons per acre. Like all of the other local organic soils, this type is particularly deficient in potash and necessitates the use of commercial fertilizers containing a high percent of this material. For grain production, these fertilizers should be applied at the rate of 200 to 400 pounds per acre, whereas for truck crops applications of from 250 to 2000 pounds per acre are usually required.

In general, Rifle peat is difficult to cultivate successfully. Reclamation costs are likely to be higher than for Carlisle muck while more work is necessary in order to bring the land to equal productiveness. No successful plantings on this soil were found among the marshes visited.

Greenwood peat is a third class farming soil, low in fertility, and, from the agricultural standpoint, the poorest of the local organic types. Should crop production be attempted, recommendations for lime and fertilizer applications made for Rifle peat should be followed. Even so, satisfactory yields could hardly be expected.

This soil type, constituting 0.5 % of the local land surface, occurs in small, scattered areas throughout the county and is seldom or never used for agricultural

purposes. No attempts to cultivate Greenwood peat could be located by the writer during this investigation.

In general, then, it appears that unless particularly favorable conditions exist or a good market can be found for certain specialized and high priced crops, the comparatively heavy expenditures of time and money necessary to the satisfactory reclamation and cultivation of organic soils are likely to be unjustifiable.

Other Possible Uses:

In addition to those mentioned above, a number of other possible uses of marsh lands or of their underlying soils have been recognized.

Timber production:

Farms which include marshy areas but lack a sufficient wood supply might be expected to benefit from the conversion of the marsh into a mature swamp type. It is assumed that in such cases a rapid transformation would be most desirable, consequently, proper drainage should be installed and grazing by livestock eliminated. On correctly managed areas, the composition of the final stand might be controlled to some extent through the planting of desirable swamp tree species. The presence of a woodlot sufficient in size to supply all farm needs should greatly increase the local land value.

Evergreen plantation:

Properly drained organic soils lend themselves well to the growing of certain evergreen trees, particularly

northern white cedar or arbor vitae, black spruce, and Norway spruce in this locality. The use of strong 2-2 stock is recommended for such plantings and, in some instances, protection against rabbit or mouse injury may be necessary. In all cases a certain amount of cultivation around the young trees is desirable in order to prevent them from being covered by weeds, while applications of fertilizer should increase the growth rate.

Plantings of this type might make possible the establishment of a profitable evergreen nursery or permit the owner to derive an income from the harvest and sale of Christmas trees.

Muskrat farm:

Several attempts have apparently been made to manage local marshes for the production of muskrats. A notable example of this type of use is located at Buck Lake on State Highway 36, northeast of Hamburg, Michigan in Livingston County. This project, covering 18 acres was begun about 1926 and, like other similar attempts, seems to have resulted in complete failure. The original capital outlay included several thousand dollars for the construction of an elaborate fence plus a considerable expenditure for muskrat stock from Nova Scotia.

Unjustifiable initial expenses plus lack of management seem to be the principal reasons for the collapse of this enterprise. Water levels have not been maintained with the result that much of the area is now occupied by

a swamp type unsuited to muskrat production.

It seems probable, however, that a number of the local marshes might well be profitably managed for this purpose. Such attempts should avoid heavy expenditures and should give particular attention to the maintenance of a suitable muskrat habitat.



Figure 8.

Muskrat Farm at Buck Lake

Areas of this type should provide sufficient duck shooting possibilities to warrant the sale of such privileges, but these projects would undoubtedly be most successful when managed in connection with a general farm program and where returns were used merely to supplement the other farm income.

Peat:

Peat deposits may be used in a number of different ways, but careful consideration should be given to the type required for these uses, as well as to the probable cost of reclamation, before enterprises of this type are undertaken.

Peat is occasionally used either alone or composted with manure as an efficient fertilizing agent. When applied alone, highly decomposed material has given best results, but ordinarily this is of little value on acid soils.

Levin (1920) has stated that peat and manure composted upon a 50-50 basis have given excellent results which are generally better than manure alone. A combination of this type appears to be the most desirable and may give good results where peat alone has decreased crop yields.

Sphagnum moss peat is commonly used in nurseries or by florists either as a mulching or packing material. At the present time the majority of this peat is imported, because of cheapness and superior quality, from the Scandinavian countries. It is possible, however, that a limited market could be found for some of the better local deposits. Success of production would undoubtedly necessitate high grade peat and would depend largely upon cost of production.

Several analyses of local peat deposits relative to their fuel possibilities have shown these to compare favorably with similar deposits of other countries.

Davis (1907) has pointed out that peat used for this purpose

should not contain over 25 % ash if sufficient heat is to be provided, but also mentions that the proximity of a particular deposit to a market often permits the utilization of the relatively inferior grades.

Although the local market for peat fuel is probably very limited, some such use might be made of individual deposits located in the vicinity of an industry requiring considerable amounts of coal or wood.

Veatch (1930) has stated that marl is at present being taken in increasing quantities from local beds. He also mentions that where this material can be excavated and piled upon high land at a comparatively low cost it becomes one of the most economical forms of lime to use.

Many of the local marshes are underlain by beds of marl, however, the possibilities of utilizing this material would depend largely upon the amount of excavation required to bring it to the surface. In some instances the utilization of marl deposits might logically follow the removal of peat for any of the purposes mentioned above.

Landscaping:

A number of the marsh areas of Southern Michigan could easily be converted into very attractive lakes. This is particularly true of those which are traversed by small streams whose waters could be backed up over the marsh by the construction of comparatively small and inexpensive dams.

Although the creation of a lake of this type would eliminate the possibility of any further agricultural use of the marsh, it might be particularly desirable on small farms

located near large cities where a demand for rural homes exists. Under these conditions, the presence of such a lake would undoubtedly increase the sale value of the property.

A similar project could, of course, be undertaken by any owner having a suitable marsh and desiring the presence of a lake upon his land, but it is expected that this would prove most attractive to the non-farming group of rural residents.

Water Storage:

Dachnowski-Stokes (1937), in recommending that sub-marginal peat areas be allowed to remain in their natural condition, has pointed out the importance of these organic deposits in the accumulation of water and the building up of a "balanced relationship between vegetation, wildlife, ground water, and stream flow".

Excessive drainage and the removal of vegetation from marsh areas have been mentioned as important factors contributing to the rapid return of surface waters to streams, consequently, water storage should be recognized as a definite marsh or peat land use. The same author has emphasized this fact by pointing out that "mistaken use can become a public as well as a private liability".

ACTIVITIES ASSOCIATED WITH USE

Drainage:

Washtenaw County possesses slightly over 300 public drains. These were constructed by the county, but are being paid for by taxes levied upon the land owners of the drainage districts. Many of these serve marshes and swamps, but numerous private ditches or tile drains have been installed by local farmers to remove excess water from individual areas. These private projects are usually connected at some point to a county drain or empty their water into a nearby lake.

Approximately 51 % of the marshes studied by the writer had been artificially drained. Open ditches were found to predominate, since tile had been installed in but three of these areas.

Definite drainage records obtained from the land owners date back 75 years in the case of the open ditch on marsh No. 26 and 70 years for the tile drains installed in No. 13 and 14. Recent drainage attempts were found in marshes No. 3 and 4 where ditches had been constructed during the summer of 1939.

Drainage had apparently been successful in 8 of the 18 marshes in which it had been attempted, while 70 % of the failures appeared to have resulted from the gradual accumulation

of soil and plant material within the ditches. Since these ditches, after crossing several separate pieces of property, frequently become stopped up either at or near their outlets, the failure of a particular project cannot always be blamed upon the marsh owner. Marsh No. 26 exemplifies this condition.

Drainage projects are usually undertaken in order to prepare a marsh for some definite type of use. This is particularly true on areas where crop production is planned, but the removal of excess water is also essential to the maximum utilization of pastured marshes.



Figure 9.

Open Ditch Drain, Marsh No. 31

Approximately 83 % of the drained marshes were being used either for pasture alone or for pasture and crop

production. On the other hand, only 58.8 % of the undrained areas were being used and these only for grazing purposes. Eighty percent of this latter group possessed sufficiently good natural drainage to permit satisfactory pasturing, but the improvement and control of moisture conditions would be absolutely necessary should crop production be attempted.

Drain construction:

Although open drains have been found to work satisfactorily in many of the local pastured marshes, the tile type is usually to be preferred if cultivation is planned. Haswell (1927) has supported his recommendation that tile be used by pointing out that such drains, in addition to working more efficiently, requiring less care, and permitting complete cultivation of the area, increase considerably the ability of the owner to control the depth of the local water table.

All drains should be carefully planned and constructed. The use of spirit levels or surveying instruments is recommended in order to insure proper location and therefore satisfactory results. The exact depth at which tile is placed is determined largely by the local water table conditions, while the diameter of the tile required depends principally upon the size of the marsh to be drained plus the percent grade of the tile system.

Particular care should be given to the construction of the outlet, since defects located at this point will seriously impair the success of the entire system. Outlets should, wherever possible, be protected against the trampling

of livestock and screened to prevent the entrance of mice and other small mammals.

Effects upon vegetation:

The principal effect of drainage is the removal of surface water and the lowering of the local water table. This condition may be immediately apparent where open ditches are used or, according to Haswell (1927), may continue to improve for several seasons if tile is installed.

Since it has been mentioned that soil moisture content is apparently the principal factor affecting the local distribution of plants within a particular marsh, any alteration of this factor could be expected to bring about noticeable changes in the vegetation growing on the area.

The removal of surface water and the reduction of soil moisture brought about by drainage usually makes possible the growth in the marsh of an increased variety of plants which, under normal developmental conditions, would be characteristic of the dryer successional stages.

As these new species begin to develop, certain members of the existing vegetation whose growth has been made possible by the presence of large amounts of water could be expected to die out, thus opening up larger and larger areas to the incoming plants. Consequently, efficient drainage may result in a complete change in the vegetative composition of a marsh merely by altering the existing water table conditions and thus creating a habitat generally dryer than that which formerly occupied the area.

Since normal successional development would gradually transform a wet marsh into a habitat largely similar to that resulting from moderate drainage, it seems likely that suitable ditching or tiling would tend to advance plant succession on the area. Such an advancement should reduce the time normally required for the marsh to develop into the swamp type.

As has been indicated above, drainage is ordinarily followed by cultivation or by the pasturing of livestock. While the former would completely destroy the marsh as a vegetative type, the latter often retards successional development. This is particularly true on heavily pastured marshes where continued selective browsing prevents the growth of certain plants and thus tends to hold the area in a stable condition. It seems probable, then, that although proper drainage brings about a more rapid successional development, associated farm uses have a tendency to counteract any permanent benefit which might be derived from this by prolonging the dominance of herbaceous vegetation suited to the newly established moisture conditions.

Effects upon wildlife habitat:

Since the drainage of wet marshes usually results in the replacement of existing conditions by a comparatively dryer type of habitat, the desirability of this practice must be determined largely by the requirements of the particular animals which are to be favored on the area.

Drainage of duck or muskrat marshes would undoubtedly be very detrimental, since it would probably destroy a habitat

capable of attracting and supporting these species. On the other hand, it might create a new habitat suited to certain upland game species such as the ring-necked pheasant or the cotton-tail rabbit.

While the muskrat is a permanent resident of the local marshes and the duck largely a transient which uses these areas for resting, and in a few cases for nesting purposes, upland game apparently seeks the cover and concealment afforded by marsh vegetation during the winter months. Since these winter residents ordinarily leave the marshes before spring flooding begins, the presence of water during this period is of little consequence. However, similar conditions, if existing during the period of use, would be particularly undesirable.

One marsh in particular, No. 4, has provided an excellent example of the extreme conditions resulting from insufficient drainage and, consequently, permits a realization of the importance of work of this type. This marsh was used by at least three pheasants during the winter of 1939-40. However, these birds apparently confined their activity to the dryer edges until water located in the center of the area became frozen and thus permitted more complete use of the marsh.

Stoppage of the drainage ditch apparently became complete during the summer of 1940 since a visit to the area in the winter of 1940-41 revealed it to be completely flooded and frozen. Cover was restricted to that provided by a few stems of cat-tail and a small clump of meadow sweet which

extended above the ice. During the previous winter this marsh had provided 88.26 % concealment.

While very few marshes, unless damned up, would reach the extreme condition described above, it seems obvious that the presence of water or ice within a marsh definitely reduces the value of the area to certain species of wildlife. Thus, in view of the fact that these undesirable conditions can be removed through tiling or ditching, moderate drainage should prove beneficial upon any marsh within which upland game species are to be favored.

Burning:

Burning of marsh lands is a common practice among the farmers of Washtenaw and the surrounding counties. Instances of this burning can be found during either the spring, summer, or fall, but apparently the greatest number of fires occur during the latter part of March and throughout April.

The principal reason for marsh burning lies in the desire to remove dead vegetation remaining from the previous growing season. This desire may be linked only with a general brush clearance program on the farm, or may be entirely motivated by a wish to improve grazing or to facilitate hay cutting.

Grazing was largely responsible for the burning of 14 of the 35 marshes which were intensively studied. Here the removal of dead vegetation was said to make the tender, young growth available to livestock as soon as it came up in the spring, thus permitting the utilization of this material

at the time when it is most acceptable to these animals.

Marshes No. 6 and 31, although unburned for a number of years, had been subjected to this practice until grazing upon them was discontinued.

Eight marshes belonging to the pastured group were not burned. Of these, No. 4 and 23 were said to be too wet, while it was the owner's opinion that the use of fire in No. 35 would endanger the adjacent swamp type. Farmers associated with the five remaining marshes expressed the belief that burning required the expenditure of more time and trouble than it was worth.

Marshes on which hay is cut are usually burned during the spring of the years in which cuttings are planned. This was found to be true of marsh No. 24 and of several similar areas visited during the course of this work. In such cases spring burning facilitates hay cutting by removing previously accumulated dead vegetation, and thus permits harvesting equipment to operate more freely over the marsh in the fall.

Marshes No. 25 and 32, although used for pasture and hay, were not burned by their owners. This was due to the fact that annual hay crops were taken from these areas, and since this cutting removed the great majority of the vegetation, it eliminated any necessity of burning.

A final reason for marsh burning lies in the belief that plant growth upon such areas can be increased through the use of light fires. The writer has been unable to substantiate this theory, but land owners prescribing to it have provided themselves with an additional reason for burning marshes in

which hay is to be cut or on which livestock is to be pastured.

Another belief, which is to a certain extent associated with that mentioned above, has an opposite effect upon the extent of marsh burning. This contends that the use of fire is often responsible for the establishment of numerous weed species within the marsh. Since the presence of such plants is undesirable, either on pastured areas or in cuttings of marsh hay, many farmers restrain from burning in order not to encourage their growth in the marsh.

Where practiced, the burning of marshes appears to be periodic, since no instances of annual burning were found within the group studied. Periodic burnings were felt to be sufficient to maintain desirable conditions, and it was found that, on the average, marshes were burned at 3 or 4 year intervals.

The ten completely idle marshes included within the sample group were, without exception, unburned. The principal reason given for this condition was that since no particular use was being made of the areas, no burning was necessary.

Two additional reasons, however, were presented in specific instances. The owner of marshes No. 13 and 14 feared that burning would destroy the soil and bring about undesirable changes in the area. Also, fire had been withheld from marsh No. 20 because of a desire to provide maximum cover for pheasants during the winter and a suitable nesting site for ducks during the spring.

A number of burned marshes were examined by the writer in an attempt to determine the effects of this practice

upon soil, vegetation, and wildlife habitat. In general, the local marsh fires appeared to be light, and, since the majority of this burning was done during the spring when organic soils contain large amounts of moisture, very little soil damage could be found.

One exception to the above statement was found in marsh No. 26. Here a comparatively hot fire had gotten out of control, burned into the surface soil in the southern part of the area, and destroyed a number of fence posts. Several other burned marshes showed superficial damage to fence posts, but should this be often repeated it would undoubtedly necessitate their frequent replacement.

Summer or fall burning would seriously endanger marsh soils, since dryer conditions generally exist and the combustible nature of organic deposits makes them particularly susceptible to even light fires.

On the marshes examined, all leafy vegetation had been removed, but the more fire resistant stems were still standing to a height of approximately eight inches. Very few plants appeared to have been killed by the fire, since new growth was evident shortly after burning. However, it is possible that certain comparatively delicate species had been completely eliminated from the vegetative cover.

A detailed comparison of species occurring on burned and unburned portions of individual marshes was made practically impossible, because fires were generally stopped only by excessive moisture conditions. Such conditions would

undoubtedly be of primary importance in determining the vegetative composition. It is apparent, however, that certain species such as aster, goldenrod, joe pye weed, and milkweed are commonly associated with burned marshes.

From the wildlife standpoint, spring burning is of comparatively little importance, since very few species normally make use of marsh areas at this time of year. In addition, those marshes which are used as nesting grounds by ducks and grebes usually contain sufficient water to make burning impossible. However, occasional nests, usually located around the marsh edges, may be destroyed by this practice, as is shown by Figure 10.



Figure 10.

Quail Nest Destroyed by Spring
Burning of a Southern Michigan Marsh

Summer or fall burning, on the other hand, would be particularly undesirable. In cases of this type vegetation is removed late in the season and, consequently, cannot be replaced until the following spring. This practice destroys almost entirely the value of the marsh to wildlife, since cover, the principal attraction on such areas, is usually completely removed.

MANAGEMENT

The management principles applied to any area must of necessity be determined by the particular use or uses to be made of the area. Under present conditions, wildlife management should play an important part in the logical land use of many of the local marshes. This is particularly true since, in addition to the heavy hunting pressure, the varied physical and chemical characteristics of the organic deposits underlying these areas place definite limitations upon the types and intensity of use which can be made of them. In all cases wildlife management should be allotted a justifiable position in a logical land use program and should serve principally as a means of obtaining maximum benefits from a marsh area.

In view of the above mentioned variations which occur both within and among the local organic soil types, no definite rules can be made for the utilization of the regions which they comprise. Likewise the needs of an individual farm must often determine which of the financially justifiable plans is to be applied to a particular marsh. There are, however, certain general practices which, if followed, should prove beneficial both to the farmer and to the wildlife populations which inhabit the local marshes.

General Practices:

Evergreen and shrub plantings should be made around the edges of a marsh. Such plantings should consist of dense clumps, since under this arrangement they would afford maximum cover and protection to wildlife.

Soils, crops, and livestock should also benefit from this protection, while landscape beautification and potential harvests of fence posts or Christmas trees should also be considered. Northern white cedar, black spruce, and Norway spruce are recommended for the marginal plantings, but such species as red pine, Corsican pine, and Scotch pine might also be used should adjacent upland areas be available.

Many of the locally obtainable shrubs such as panicled and red osier dogwood, Spiraea, elderberry, high bush cranberry, raspberry, hawthorn, willow, nightshade, bittersweet, honeysuckle, and wild grape might be used to comprise the shrub planting.

Plantings should be made either in the spring or fall at a time when growth is not taking place. Stock should be set out on small, cleared patches of soil and protected against grazing, burning, and in some cases, rabbit or mouse damage. Plantations should also be kept comparatively free from weeds until sufficient growth enables the stock to compete satisfactorily with such species.

Food and Cover Lanes:

Fence rows connecting the marsh with feeding areas or

with other possible roosting sites should be allowed to grow up in brush, thus providing suitable travel lanes for wildlife. Narrow strips of uncut hay are also very desirable for this purpose, while standing grain left around the edges or in the corners of nearby fields will increase materially the potential value of the marsh cover.

Food Patches:

Small, inexpensive food patches could be located on upland areas adjacent to the marsh. Continuous cover or travel lanes should connect these to the marsh. Food patch mixtures might include sudan grass, buckwheats, millets, sorghums, corn, cowpeas, and soy beans.

Additional Use of Adjoining Upland:

Wherever possible, brushy areas located in the immediate vicinity of marshes should remain undisturbed in order to provide suitable rearing grounds for young pheasants. Such grounds would have the added advantage of being closely associated with the good escape cover provided by the marginal plantings as well as the marsh proper.

Marsh Hunting:

The hunting of marshes and adjacent plantations should be discontinued in order to provide natural sanctuaries during a critical period in the lives of game birds. However, cover plantings may be strategically located on surrounding uplands in order to hold cock pheasants out of the marshes

during the hunting season. Such plantings should provide sufficient hunting to eliminate the necessity of using marshes for this purpose.

Marsh Burning:

Burning of marshes during the summer or fall should be prohibited. However, the use of light fires during the spring while marsh soils are in a moist condition might be permitted should such burning be justifiable on the basis of agricultural use.

Specific Uses:

Marshes managed for muskrats or ducks should be left undrained with permanent water levels maintained at all times. The majority of the area should be flooded with several feet of water, since such a condition fosters the development of desirable food and cover plants. Pond lilies, cat-tail, bulrush, sedge, pondweed, water plantain, and duckweed should be planted in marshes in which they are not found at the time of flooding. Grazing should be prohibited upon marshes managed for this purpose.

Drainage Policy:

All marshes other than those managed for ducks or muskrats should be properly drained wherever practicable. Tiles are recommended for this purpose, but carefully constructed open ditches may prove satisfactory, particularly if crop production is not planned. Such ditches should be cleared

annually in order to insure best results.

Correct drainage is an essential step in preparing the average marsh for any of the majority of possible uses. It is also a definite benefit to upland game since surplus water drives such species out of the marshes, while the presence of ice during the winter reduces the availability of food and cover.

Grazing Policy:

The pasturing of livestock in marshes should be eliminated wherever practicable, although light or even medium grazing could be permitted without seriously damaging the wildlife habitat.

Marsh pasturing would be most easily justified on areas where true grasses comprise a high percent of the native vegetation or where forage crops had been planted on such land. Alsike clover, timothy, meadow foxtail, and bluegrass sown as a mixture are recommended for forage plantings on organic soil. However, careful consideration should be given to the local soil requirements and drainage conditions before this is undertaken.

At least one portion of the marsh should be allowed to remain in native vegetation and should be fenced against livestock. Such fencing would eliminate, within a small area at least, the disturbance of wildlife caused by the presence of domestic animals. Certain irregularities of outline which are characteristic of the majority of marsh areas should lend

themselves well to this practice.

Marsh Hay Cutting:

Hay cutting in marshes should be abandoned wherever practicable, since this practice necessitates the removal of vegetation at the beginning of the period in which it is of the greatest value to wildlife. On marshes in which this represents an important and justifiable use, it may be permitted, but small patches of cover should be allowed to remain where harvesting is difficult.

Cultivation:

Since only a small percent of the organic soils are either suited or required for agriculture, any cultivation of such deposits should be made only after a careful consideration of local conditions has left no doubt concerning the wisdom of the attempt. Otherwise the expenditure of considerable amounts of labor and capital will probably result only in the needless destruction of a desirable wildlife habitat.

Production of grains or truck crops may be justifiable upon many of the local deposits of Carlisle muck and upon a smaller number of those designated as Rifle peat. In general, such attempts should not be undertaken on Kerston muck, Houghton muck, or Greenwood peat, but individual exceptions to this statement may occur. In these as well as in all other cases, cultivators of organic soils should recognize the many limitations and be prepared to meet the various individual requirements of the particular type on which crop production is planned.

Small irregularities in the outline of cultivated marsh areas should be left unplowed in order to preserve at least a small percent of the native wildlife cover. These omissions might be justifiable also because of the difficulty involved in cultivating and harvesting in such areas.

Wherever grains are grown on marsh soils, narrow strips should be allowed to stand around the edges of the area throughout the winter. This practice would considerably enhance the value of even small, uncultivated patches of native marsh vegetation.

Timber Production:

Should long time planning of marsh use have as its ultimate goal the conversion of the area into a farm woodlot, proper drainage and the elimination of grazing would be of primary importance. Once normal ecological succession had advanced to the swamp shrub stage, the process might be hastened through the planting of suitable tree species.

Wildlife should benefit by the exclusion of activity from the marsh, and, while the type of use made of this area would undoubtedly change with the development of woody vegetation, management principles should be modified from time to time so as to take advantage of the particular habitat existing on the area at any given time.

CONCLUSIONS

Present Status:

Marsh lands have arisen either through the filling of lakes and ponds or as a result of the saturation of surface soils by seepage from springs or by high water tables.

Although marshes occur locally as comparatively small units, they constitute approximately 5 % of the land surface of Washtenaw County. Such areas might also be expected to comprise slightly over 1000 acres of the average township and consequently would occur on a high percent of the total number of farms.

Marshes are used extensively by the large majority of the local game animals as well as by many other forms of wildlife. In addition, these areas have been given an important place in the agricultural program of many of the farms on which they occur.

Drainage, generally considered a prerequisite to most uses, has been installed in approximately 50 % of the local marshes. Open ditches predominate since intensive use is rarely planned, and the mere removal of surface water appears to be the principal objective.

Marsh burning is practiced on many of the pastured areas and in a few in which hay is occasionally cut. Fires are generally light, however, and since the majority are set during

the spring when soil conditions are particularly moist and after the winter game populations have moved out of the marshes for the summer, they appear to do very little damage.

Carlisle muck, an organic soil characterized by a comparatively advanced stage of decomposition, constitutes the principal type underlying the local marshes. This soil is particularly suited to the growing of certain truck crops, but very little intensive cultivation has been attempted upon it or upon any of the other local organic types.

Approximately 72 % of the total marsh area is pastured as compared to 22 % idle and 6 % in cultivation.

Value for Present Farm Uses:

The principal value of marsh land under the present farm program lies in the water supply which these areas make available to livestock. Since in the majority of permanent pastures no attempt has been made to secure water other than that provided by a marsh, this constitutes an essential, and therefore a very important use.

Marshes which support grasses and narrow leaved sedges should provide good grazing particularly during the spring and early summer. Such areas should be properly drained if maximum utilization is expected. On the whole, marsh pastures in Washtenaw County could be improved by more careful management and would thus take on an added value from the farm use standpoint.

Marsh hay could be used advantageously to supplement upland harvests should cuttings be made only where the better

quality vegetation exists. It is apparent, however, that this is no longer an important product in this locality and thus constitutes only a minor value on a comparatively few farms.

Intensive cultivation of the local organic soils appears to be seldom justified, but a number of successful attempts have proven the potential value of certain types, particularly Carlisle muck. Since the reclamation of these areas generally involves the expenditure of considerable amounts of labor and capital, local demand for the more or less specialized crops which are normally produced is the principal factor determining the present value of marshes for agricultural purposes.

Value as a Wildlife Habitat:

The wide variety of conditions which exist among the local marsh areas have made them particularly suited to the needs of both resident and migratory wildlife.

Flooded marshes provide an ideal habitat for the year round residence of the muskrat, and although this species has been found to occur in comparatively small numbers in individual areas, it seems probable that the total marsh acreage of Wash-tenaw County contains a high percent of the local population.

Migratory waterfowl utilize flooded areas as resting places during migration. In addition, certain species frequently can be found nesting in marshes after the main flocks have passed.

From the wildlife standpoint, the principal value of marshes lies in the almost perfect winter roosting sites which

are provided for the ring-necked pheasant by the great majority of these areas. In such cases, cover apparently offers the greatest attraction, consequently, the wide dispersion of comparatively small marsh units throughout agricultural land is of prime importance in allowing birds to utilize the best food available in a region. No other single cover type shows the consistently high winter value characteristic of the marsh.

Properly drained, ungrazed sedge marshes usually represent ideal cover conditions, but in spite of various types of treatment, the majority of the local marsh areas afford all the protection necessary to the successful over wintering of a large pheasant population.

Cotton-tail rabbits also make considerable winter use of marsh lands and, as in the case of the pheasant, are apparently attracted by the good cover and concealment provided by normally dense vegetation.

Mink and weasel frequently range over marshes in search of food, but do not make as intensive use of these areas as pheasants or rabbits.

Possibility of Multiple Use:

The local marshes apparently lend themselves well to a multiple use plan which, under present conditions, should include wildlife management.

Marsh improvement, usually necessary for the various farm uses, is also desirable from the standpoint of the majority of game species making use of such habitats.

Light or medium grazing can be permitted without damaging vegetation sufficiently to destroy its cover and con-

cealment value, while the practice of leaving certain small uncultivated portions or unharvested patches of hay can ordinarily be justified by sound farm management as well as by the value of these spots to wildlife.

Marginal plantings of conifers and shrubs are very desirable around any marsh, since they afford protection to soils, crops, livestock, and wildlife. In addition, such plantings increase the esthetic value of the area, while the eventual wood or timber crop can often be used to good advantage in a number of ways around the farm.

In general, none of the locally important farm uses should, under proper management, operate to the complete exclusion of wildlife from the marshes.

Attitude of the Farmers:

The farmers of Washtenaw County are, on the whole, sincerely interested in the game possibilities of their marshes. The intensive use made of these areas by game birds appears to have fostered this interest, since large pheasant concentrations moving to and from marshes at a time when other cover is scarce, can often be easily seen and thus have attracted the attention of many land owners.

Most farmers appear to take a personal pride in the mere presence of game upon their land, and none have been encountered who were not desirous of keeping at least a small population on the farm.

Although the majority of land owners recognize the use which is made of marshes by pheasants, there seems to be

a lack of complete realization of the importance of this particular type of habitat.

On the other hand, the great majority of farmers who have been approached with suggestions for improving the wildlife environment within and around their marshes, have been willing to admit that practices mentioned would probably be beneficial to their general farm program.

Thus it seems probable that any concerted attempt to improve marsh conditions within Washtenaw County would find willing supporters among the local land owners provided practices were made sufficiently elastic to work easily and logically into the individual farm programs.

Possibility of Exclusive Wildlife Use:

The restoration, improvement, and use of a number of the local marshes, primarily for wildlife, is definitely in keeping with current conservation and land utilization policies. Areas of this type are constituted primarily by marshes located upon deposits of Greenwood peat, but certain unique characteristics of deposits of other organic soils may logically place them within this class.

It should be pointed out, however, that in these cases wildlife cannot be considered the sole use, since water conservation and the preservation of organic raw materials is of prime importance, particularly in agricultural regions.

Many factors apparently indicate that the universal reservation of marsh lands for wildlife and related uses would be impossible. On the other hand, definite accomplishments

could be made should such a program limit itself to the prevention of ill-advised use and conform to the current practice of sub-marginal land retirement.

Advisability of Exclusive Wildlife Use:

On the whole, local conditions appear to make any attempt to utilize marsh areas solely for wildlife purposes inadvisable; and in view of the extensive use now made by game animals of pastured and similarly used areas, a general program of this type seems unjustifiable. It also appears that management principles outlined above have sufficiently emphasized multiple use to eliminate any necessity of attempting to justify a policy which would, to a certain extent, restrict the benefits or values that might be derived from marshes.

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APPENDIX

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* List compiled principally from Fassett (1940).

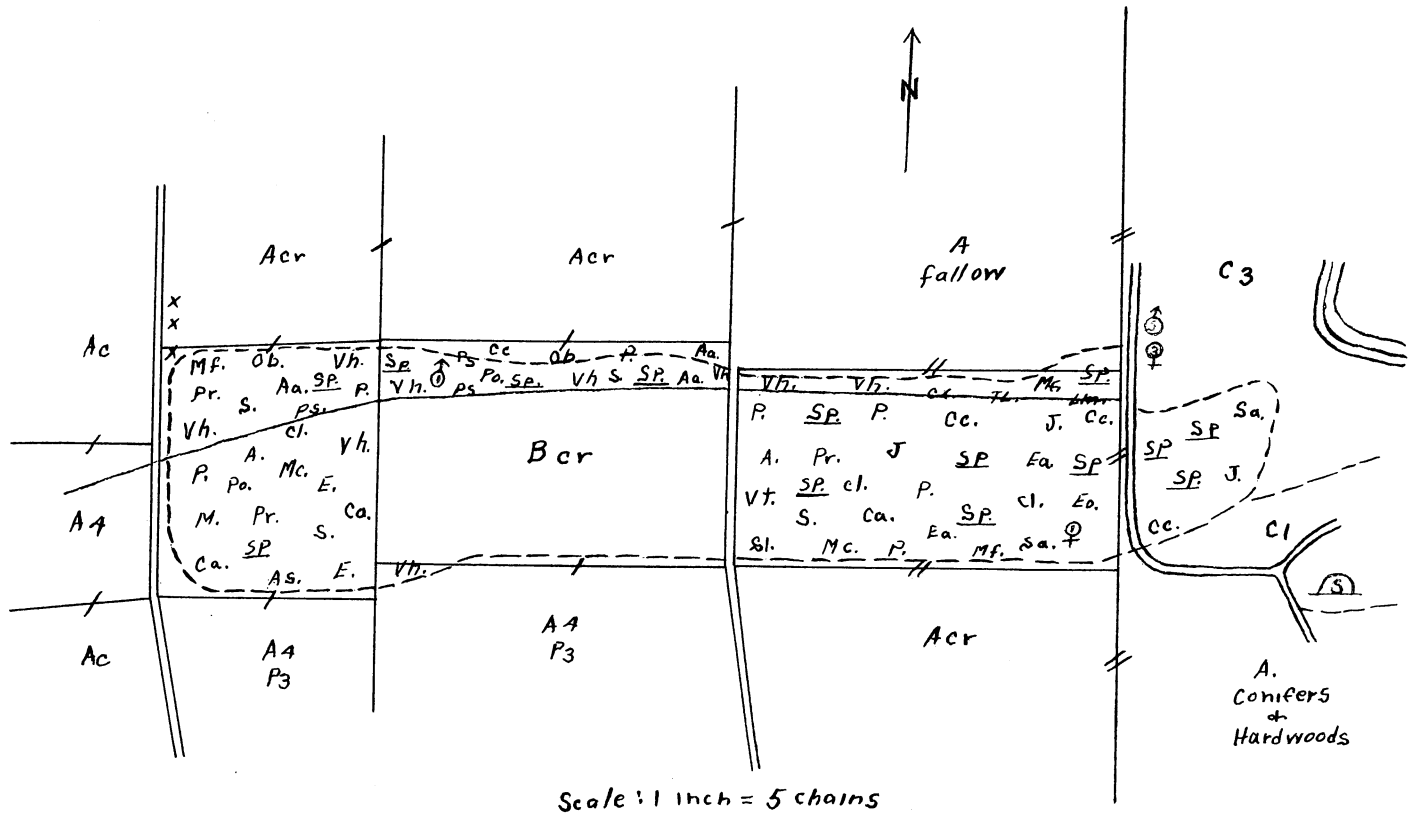
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<u>Plant Species</u>	<u>Publications Referring To Use</u>
Alisma Plantago-aquatica	7.
Alnus (buds, leaves, flowers)	6.
Bidens	5, 9, 10, 11, 12, 14, 15.
Bidens comosa	7.
Cornus stolonifera	11, 16.
Cornus paniculata	4.
Carex spp.	1, 4, 11, 12.
Gramineae	1, 2, 3, 4, 5, 11, 14.
Echinochloa spp.	11.
Echinochloa pungens	5, 12, 14, 15.
Scutellaria lateriflora	7.
Lemnaceae	12.
Lemna spp.	12.
Spirodella polyrhiza	12.
Polygonum spp.	1, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15.
Polygonum pennsylvanicum	6, 15.
Polygonum persicaria	6, 7, 15.
Rumex spp.	6, 10, 11, 12.
Rubus sp.	4.
Ranunculaceae, Caltha palustris	1, 4.
Ranunculus spp.	15.
Galium spp.	1, 7.
Salix spp.	6, 16.
Solonaceae	14.
Solanum Dulcamara	1, 2, 3, 4, 5, 7, 16.
Sambucus canadensis	4.
Verbena hastata	4.

No. 1 Twp. Sec. 26 Loc. S 1/2
 P.O. No. 8 + 9 Area: chs. x chs. 36.78 AC.
 Type classes B7
 Pres. Use Pasture 75.2%; Cultivation 24.8%
 Past Hist. Glacial outwash - lake basin type
 Cultivated until 10 years ago - became too wet - Pastured
 since that time - Burns at intervals of 4 years - Ditch cleared
 Spring 1939. Plowed 1939 - planted 1940
 Former size Extended 10 - 15 chains westward
 Use trend To cultivation again as ditch dries up area.

Soil type Catlisle Much pH 7.0
 Vegetation: Dom. Spiraea alba Codom. Pos.sp.
 Assoc. so. A., Vh., Cay. S., Ro., Ga., Cr., M., F., Mc., Sl., J., Vt.,
 As., Ps., Rv., As., Ob., Po., Pv., Ar., Pn., Il., Ch., Lm., Mf., Eo., Ea.
 Food: Quant. 13.36 Qual. 22.00
 Av. 14.25

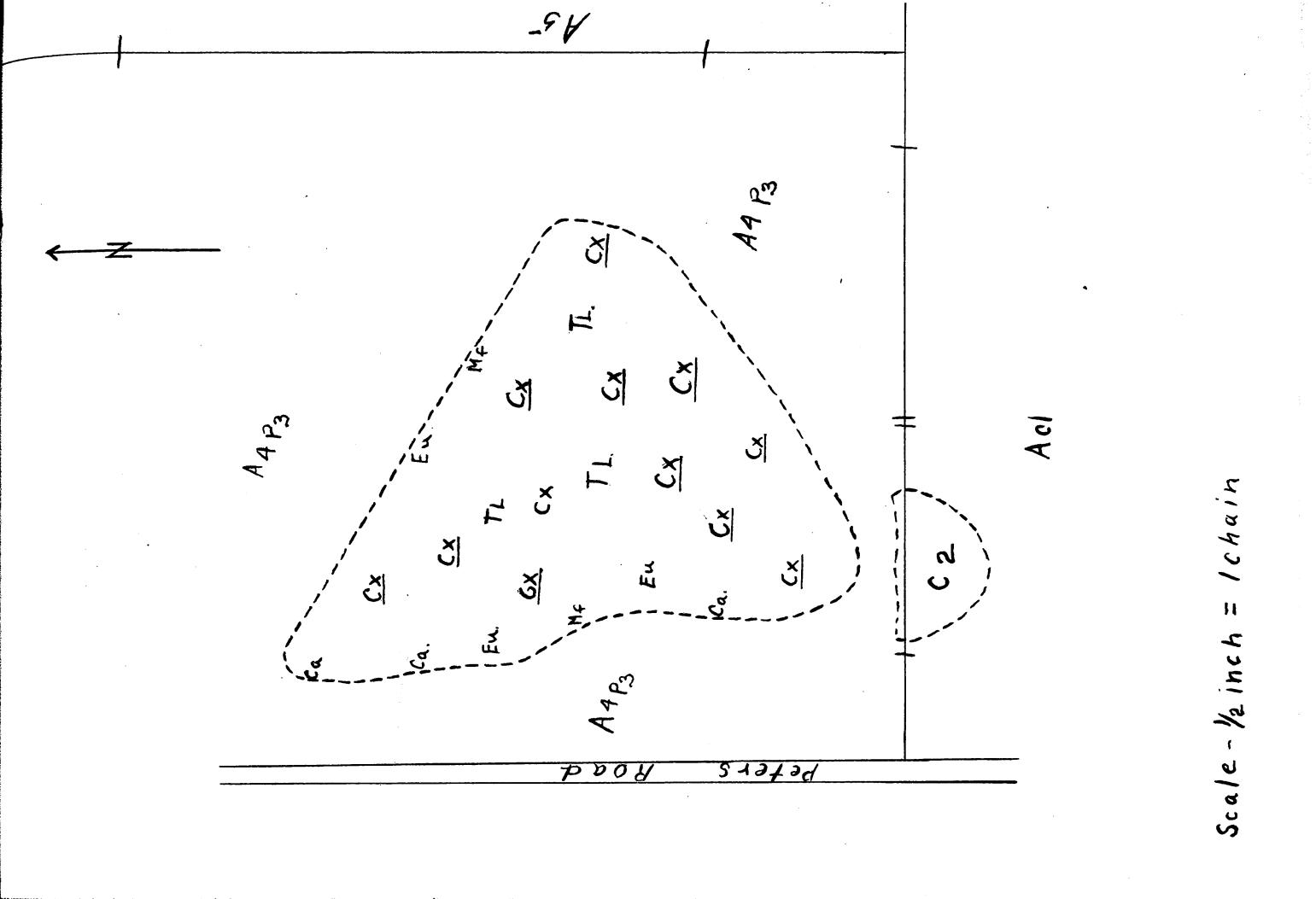
Cover: H. 15.20 D. 27.86 S. 10.36
 Concealment: Hor. 26.32 % Vert. ---
 Surrounding Land: Des. Gently rolling Ag + pasture - Lake + woods + F.
 Food: Quant. 22.00 Qual. 33.00
 Av. 33.00 Dist. 0 - 10 Chains
 Dist. to Suitable cover 1 ch. to swamp on east side.
 Grazing: Type and Intensity: Past Same as present for
 Past 8 years Pres. 1/4 cattle - 3 bro (Unit per 1.02 Ac)
 Effects on veg. Severely grazed and trampled
 on game hab. Potential cover considerably reduced.
 Weather con.: Marsh 6" - 46" - 45° BH 44° - 42° clear sky
 Surrounding Area 6 - 42° - 42° BH - 41° - 41°
 Imm. past gen. Partly cloudy - rising temperatures
 wildlife: observed 2 ♀ pheasants (5.7 + 3.8 on west edge)
 observed 1 ♂ pheasant, 1 ♂ pheasant.
 Tracks Pheasant, Rabbit
 Other signs Rabbit fur - Hawk feathers.
 Owners value Thinks it fine corn land.
 Notes Adjacent swamp formerly Aspen, Elm + red
 maple taking over during past 15 years. No human
 disturbance in this part of area. Marsh not posted
 Usually hunted - Good crop results 1940.
 14.8 acres pastured.



Date November 20, 1939
 No. 2 Twp. S. 10 S. 10 Loc. SW 1/4
 Sec. 10 Area: chs. x chs. 3.84 Ac.
 Type classes B5
 Pres. Use Pasture
 Past Hist. Approximately the same for last 20 years. Has burned occasionally but not for the last 2 years. Always pastured.
Terminal means of Huron Erie Lobe - Small Lake basin.
 Former size 8 X 7 X 9 Chains
 Use trend Continued grazing

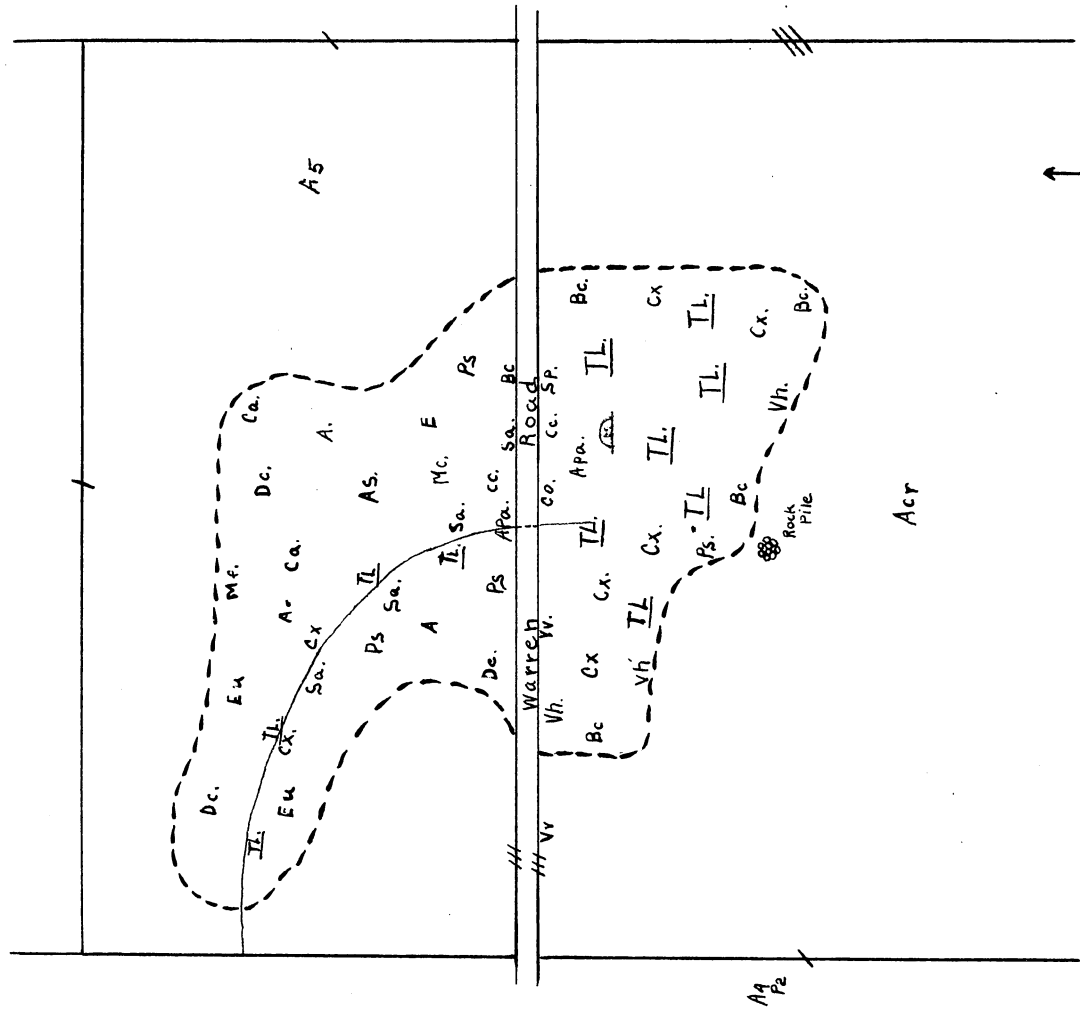
Soil type Houghton Muck pH 5.3
 Vegetation: Dom. Carex lascastris Codom. None
 Assoc. so. Bensset, Cat-tail, Canada thistle, Wild Bergamot
 Food: Quant. 11.25 Qual. 0
 Av. 15.40
 Cover: H. 28.90 D. 31.05 S. 23.37
 Concealment: Hor. 62.28% Vert. ---
 Surrounding Land: Des. Rolling A4B3 Asl.
 Food: Quant. 11.00 Qual. 22.00
 Av. 22.20 Dist. 25 chains to south.
 Dist. to Suitable cover 1/2 ch to C2, otherwise 18 ch. to N.
 Grazing: Type and Intensity: Past 40 Sheep-3 hie (Unit per 2.89 ac) Pres. 45 sheep-3 hie (1 unit per 2.57 ac.)
 Effects on veg. Slight trampling on game hab. Continuity of cover reduced by trampled spots.
 Weather con.: Marsh 6"-20", 18° BH-14", 13° 2" Show, High wind.
 Surrounding Area 6"-9", 8° BH-8", 6° Drifting-Short High wind
 Imm. past gen. Light show, High winds. Temp well below 20°
 Wildlife: observed
 census

Feces Pheasant (5 spots)
Dens 1 bird nest
Tracks Pheasant
Other signs 3 dusting spots on edge.
 Owners value Very little - would prefer it to be upland.
 Notes No water or flooding evident - good natural drainage
Land not posted - Hunted last season. Don't know how many birds killed. Burns to remove old vegetation for sheep - 3 yrs intervals.
23.19 acres in the pasture.



Scale - 1/2 inch = 1 chain

Date Nov. 22, 1939
 No. 3 TWP. Ann Arbor S. Loc. NW 1/4 Ac.
 Pic. No. Area: chs. X chs. 2.8
 Type classes B. A-7
 Pres. Use None
 Past Hist. Ground remains
shallow open ditch put in in 1939. Not completely satisfactory.
No burning or grazing known to have been done.
Dr. T. S. at sea.
Former size probably connected to #4 and extended 3-4 ch. to NE.
use trend to agriculture if area dries out sufficiently.
 Soil type Brockstone loam pH 5.9
 Vegetation: Dom. Typha latifolia Codom. Carex lacustris
 Assoc. SO. Eu. ME, Ps., Ca, Dc, Sa, Vh, Bc, cc, SP, Apa, E
 Food: Quant. 12.44 Qual. 0
 AV. 18.96
 Cover: H. 27.84 D. 28.79 S. 21.22
 Concealment: Hor. 65.50% Vert. 33.00
 Surrounding Land: Des. Rolling upland. Pasture & Agricultural.
 Food: Quant. 26.38 Qual. 33.00
 AV. 29.42 Dist. Adjacent field + fence rows.
 Diet. to Suitable cover 3 chains
 Grazing: Type and Intensity: Past None
 Pres. None
 Effects on veg. None
 on game hab. None
 Weather con.: Marsh 6" - 41f. BH - 38f. Shady V.V. Wind
 Surrounding Area 6" - 38f. BH - 36f. " " "
 Imm. past gen. Cold and cloudy
 Wildlife: observed Song sparrow, crayfish, 1 Mallard
 census None
 Peces Quail (weat), weasel on rock pile.
 Dens 1 Muskrat house in use
 Tracks Muskrat, Quail on edge, weasel
 Other signs None
 Owners value Useless in present condition unless drainage allows planting
 Notes Land posted - Soil very moist, occasionally water
evident in low spots. Drainage not completely satisfactory.
2/16/40 - Completely covered by stubs; practically no food or cover.
No hunting



Scale 1/2 inch = 1 chain

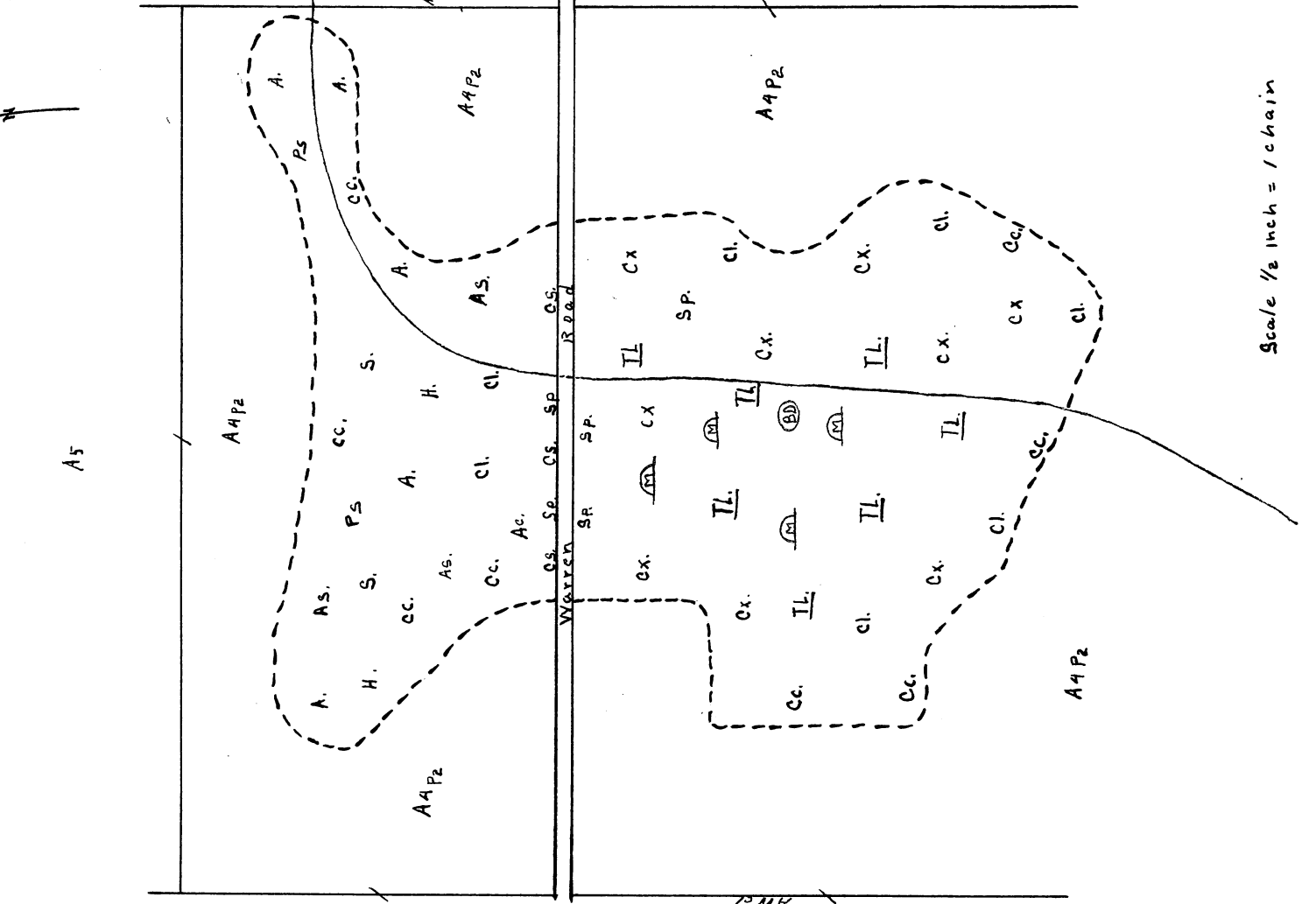
No. 4 Twp. Abb. Arber S. 10 Loc. NW 1/4
 Sec. No. 10 Area: chs. E chs. 3.9 AC.
 Type classes BA-7
 Pres. Use Pasture
 Past Hist. Ground Moxaine

Surrounding area pastured for many years. Drainage ditch put in during summer of 1939. Seen stopped up. Very little change yet.
 Former size probably subdivided with #3 and extended 30-40 chs. to S.W.
 Use trend Will apparently continue to be used as pasture - extent of use will be determined by effectiveness of drainage.
 Soil type Brockstone loam pH 5.9
 Vegetation: Dom. Typha latifolia Codom. Carx. spp.
Asoc. so. Ps. cs. sp. As. S. H. Cs.

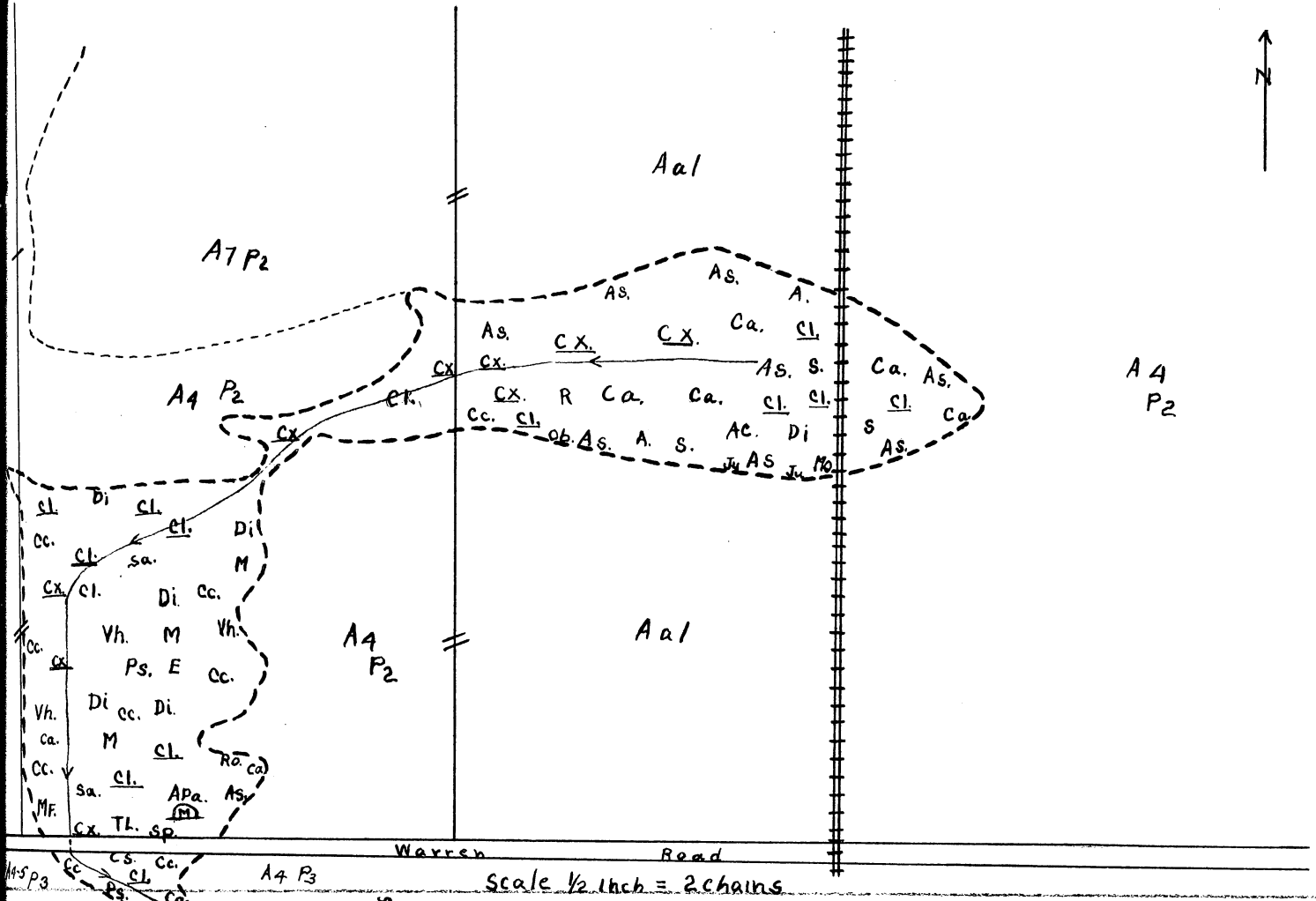
Food: Quant. 12.35 Qual. 0
 AV. 8.73
 Cover: H. 21.62 D. 26.38 S. 20.68
 Concealment: Hor. 88.26 % Vert.
 Surrounding Land: Des. Rolling to flat. Ag. Pasture. Swamp (sw.)
 Food: Quant. 26.38 Qual. 33.00

AV. 29.42 Dist. 2 chains
 Dist. to Suitable cover 3 chains
 Grazing: Type and Intensity: Past 8-10 cattle for at least 6 years (-15 to 19 ac.) Pres. 8 cattle - 3 mo. (unit per 1.88 ac.)
 Effects on veg. Slight trampling in dryer portions & around edges on game hab. Concealment slightly reduced in spots.
 Weather con.: Marsh 6"-36". BH-35% Ice on area. Cloudy
 Surrounding Area 6"-39". BH-35% No ice. Cloudy
 Imm. past gen. Cloudy - light wind - freezing or just above
 Wildlife: observed 2 Black Ducks. Pheasant 3 ♀
 census

Feeds 9 groups of pheasant in dry portion, Muskrat
 Dens 1 Muskrat dens in use.
 Tracks
 Other signs
 Owners value Very little in present condition
 Notes Land pasted - water & ice on 75% of area - Sept. 6-9"
Drained so that cattle could use area so far too wet to burn.
Used as source of water for cattle while on area. 2/16/39 - completely covered with snow, no feed or cover available. 3/23/41 - 5/2 flooded above vegetation. Don't bother to trap. Trapped by resident of Abb.
No hunting 15.1 acres in pasture.



Scale 1/2 inch = 1 chain



Date November 26, 1939
 No. 5 TWP. Ahh Arbor S. 4 Loc. SW 1/4 Ac.
 Sec. No. Area chs. 9.6 chs. 9.6 Ac.
 Type classed B6
 Use Pasture
 Past Hist. Glacial Outwash
 Condition about the same for the past 40 yrs. Has always been used to pasture 14-20 cattle during this time. Open ditch drainage for at least 50 years. Former size practically the same as at present use trend Pasture

Soil type Carlisle Muck pH 6.9
 Vegetation: Low. Carex spp. Codon. Calamagrostis canadensis
 Assoc. so. Sa., S., Vh., F., As., Bo., A. Pa., Ca., Di., Th., Ps., M.
 Mf. cs., Ob.
 Seed: Quant. 9.32 Qual. 11.00

Cover: E. 13.26 D. 29.25 S. 18.52
 Concealment: Low. 38.36%
 Surrounding Land: Low. Rolling upland - Pasture, woodlots, & Ag.
 Food: Quant. 19.44 Qual. 22

Dist. 28.64 Dist. 20-25 chains
 Dist. to Suitable cover Approx. 18 chains
 Grazing: Type and Intensity: Past 14-20 cattle, May-Sept. Post 40 years. Pres. 14 cattle may to Sept. 1939 (1 cow per 6.9 ac) affects on veg. medium grazed & heavily trampled on game hab. concealment considerably reduced.
 Weather con. March 6-48° BH. - 45° Clear & light wind
 Surrounding Area 6"-45° BH. - 44°
 Imm. past gen. Clear & Windy, he shew, temp. in 40's
 Wildlife: observed 1 Rabbit
 census

Traces Muskrat(s), Weasel(s), Skunk(s), Rabbit
 Dens 1 old muskrat house, 1 Bird nest
 Tracks Weasel, muskrat, Skunk, Rabbit
 Other signs 1 Pheasant feather.

Owners value Has no idea of value
 Notes Land Pested - drainage to S.E., No water Present when mapped, Marsh not used as a source of water for cattle. Occasional burning for stock.
3/23/91 - Ditch partially stopped up, muskrats are about 1/3 of the area. No hunting permitted 20.3 acres in pasture

No. 6 Twp. Webster S. 15 Date Nov. 26, 1939
 Loc. SF 1/4
 Area chs. x chs.
 Type classes B4-5
 Uses, Use None
 Past Hist. Ground Meraine
 Grazed by 6-8 cattle during summer months up to 1932. Has been lying idle since that date.

Former size Appear the same as at present
 Use trend Will probably be idle under present ownership - possibility of it being purchased

Soil type Houghton Muck pH 6.9
 Vegetation: Dom. Carex lacustris Codom.
Asoc. SO. Typha, Scirpus a. Phragmites, Carex lanuginosa, Calamagrostis, Verbena, Solidago, Carex lurida

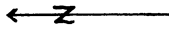
Food: Quant. 11.61 Qual. 0.00
 AV. 26.91
 Cover: H. 25.40 D. 32.44 S. 24.92
 Concealment: Hor. 98.28 Vert. 70

Surrounding Land: Des. Practically flat. Cr. 10 ch, Aer. 14 ch, As. adjacent
 Food: Quant. 30.36 Qual. 33.00
 AV. 31.54 Dist. corn 14 ch, wild seeds 1 ch
 Dist. to Suitable cover 10 chains (roosting)

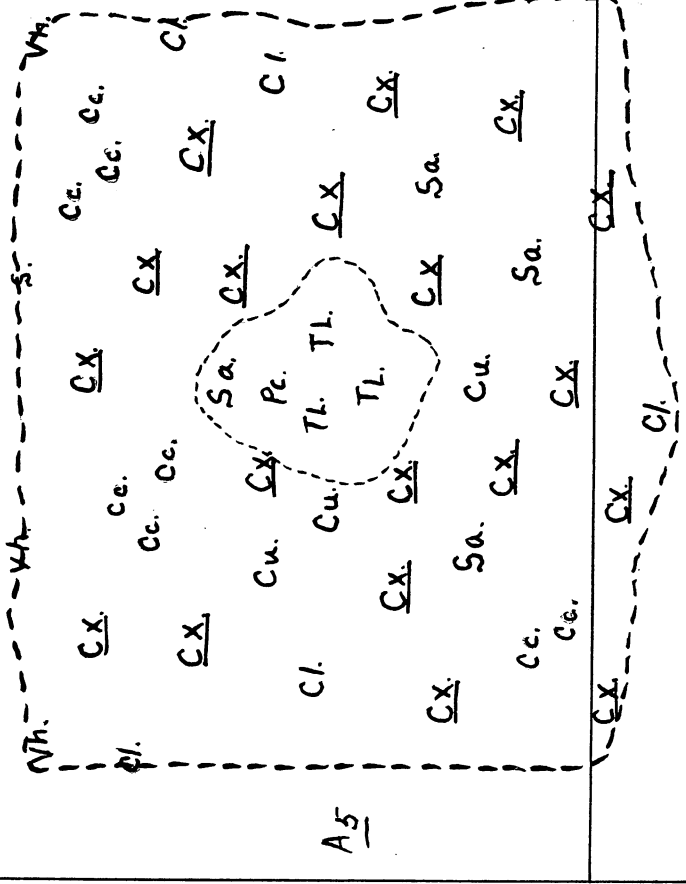
Grazing: Type and Intensity: Past 6-8 cattle - 3 hrs.
 Pres. None
 Effects on veg. No evident effects of past grazing on game hab.
 No evident effects of past grazing.
 Weather con.: Marsh 1" - 28, 26° BH - 24° 21° Clear no wind
 Surrounding Area 6 - 20°, 19° BH - 19° 18°
 Imm. past gen. Clear + cold, no wind or snow
 Wildlife: observed Pheasant 2 ♂ + 1 ♀
 census

Neces Pheasant
 Dens None
 Tracks Nice
 Other signs

Owners value Only value lies in its attractiveness to birds.
 Notes land pasted - No hunting permitted. No birds killed in area for several years. No water present but very moist in center. No burning since 1932 because not using pastures. Stopped pasturing because got rid of cattle.



A5



A5

Scale 1 Inch = 1 chain

Date Oct. 31, 1939

No. 1 Twp. sec. S. 26 Loc. S 1/2
Pic. No. 8 + 9 Area: chs. x chs. 36.18 Ac.
Type classes B7
Pres. Use Pasture 75.2 %; Cultivation 24.8 %
Past Hist. Glacial outwash - Lake basin type
Cultivated until 10 years ago - became too wet - Pastured
since that time - Areas at intervals of 4 years - Ditch cleared
Spring 1939. Plowed 1939 - planted 1940
Former size Extended 10 - 15 chains westward
Use trend To cultivation again as ditch dries up area.

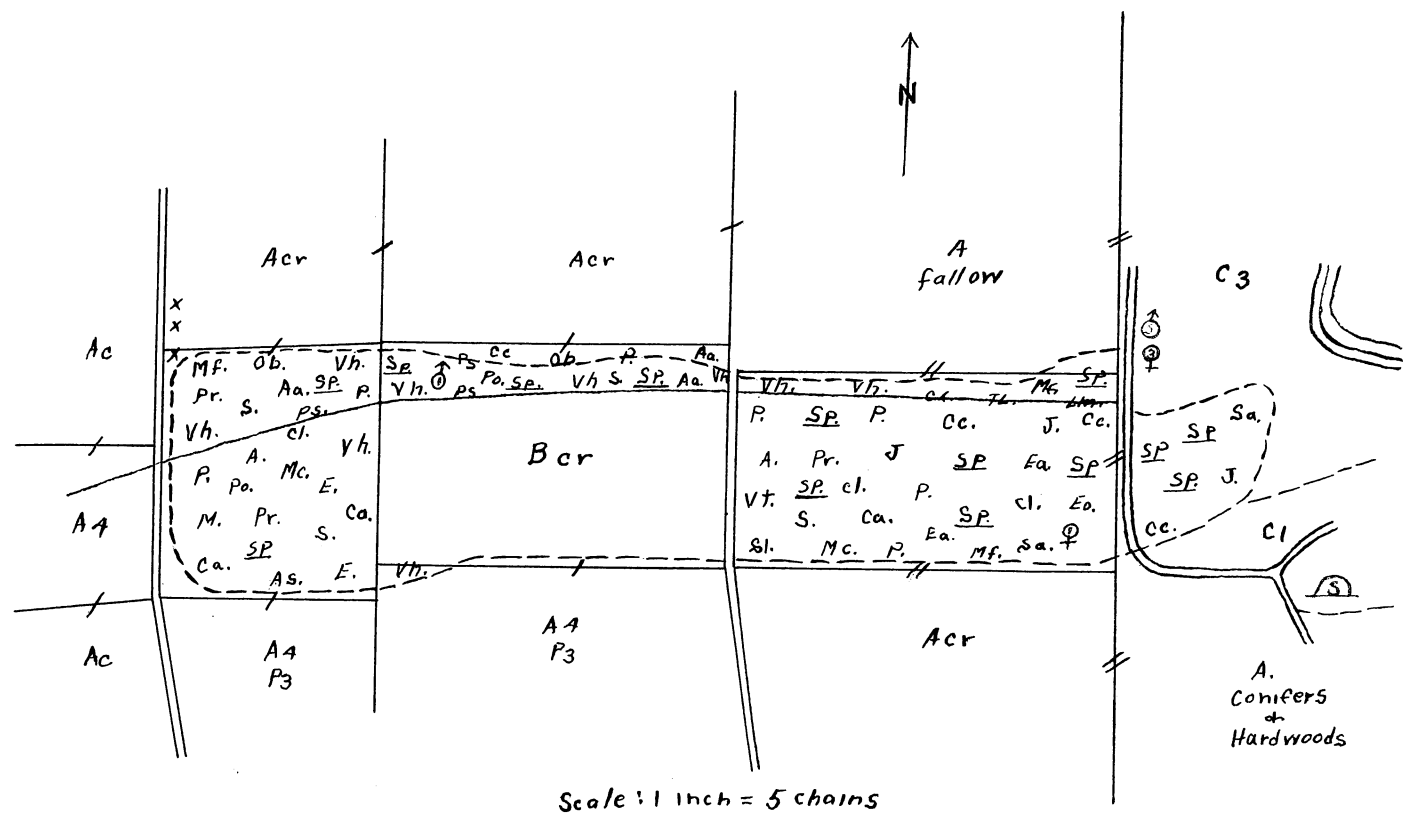
Soil type Catulise Muck pH 7.0
Vegetation: Dom. Spiraea alba Codom. Pop. sp.
Assoc. so. A., Vh., Cay. S., Ro., Ga., Cr., M., F., Mc., Sl., J., Vt.,
As., Ps., Rv., As., Ob., Po., Pv., Ar., Pn., Il., Ch., Lem., Mf., Ed., Ea.
Food: Quant. 13.36 Qual. 22.00
AV. 14.25

Cover: H. 15.20 D. 27.86 S. 10.36
Concealment: Hor. 26.32 % Vert. ---
Surrounding Land: Des. Gently rolling Ag + pasture - Lake + woods to E.
Food: Quant. 22.00 Qual. 33.00
AV. 33.00 Dist. 0 - 10 chains

Dist. to Suitable cover 1 ch. to swamp on east side
Grazing: Type and Intensity: Past same as present for
Past 8 years Pres. 14 cattle - 3 hcs (Unit per 1.02 Ac)
Effects on veg. Severely grazed and trampled
on game hab. Potential cover considerably reduced
Weather con.: Marsh 6" - 46" - 45° BH - 44° - 42° clear light
Surrounding Area 6 - 42° - 42° BH - 41° - 41° " " "
Imm. past gen. Partly cloudy - rising temperature
Wildlife: observed 2 ♀ pheasants (5.8 + 3.8 on west edge)
censuses Rabbit 2, Marsh Hawk 1, 1 ♂ pheasant.

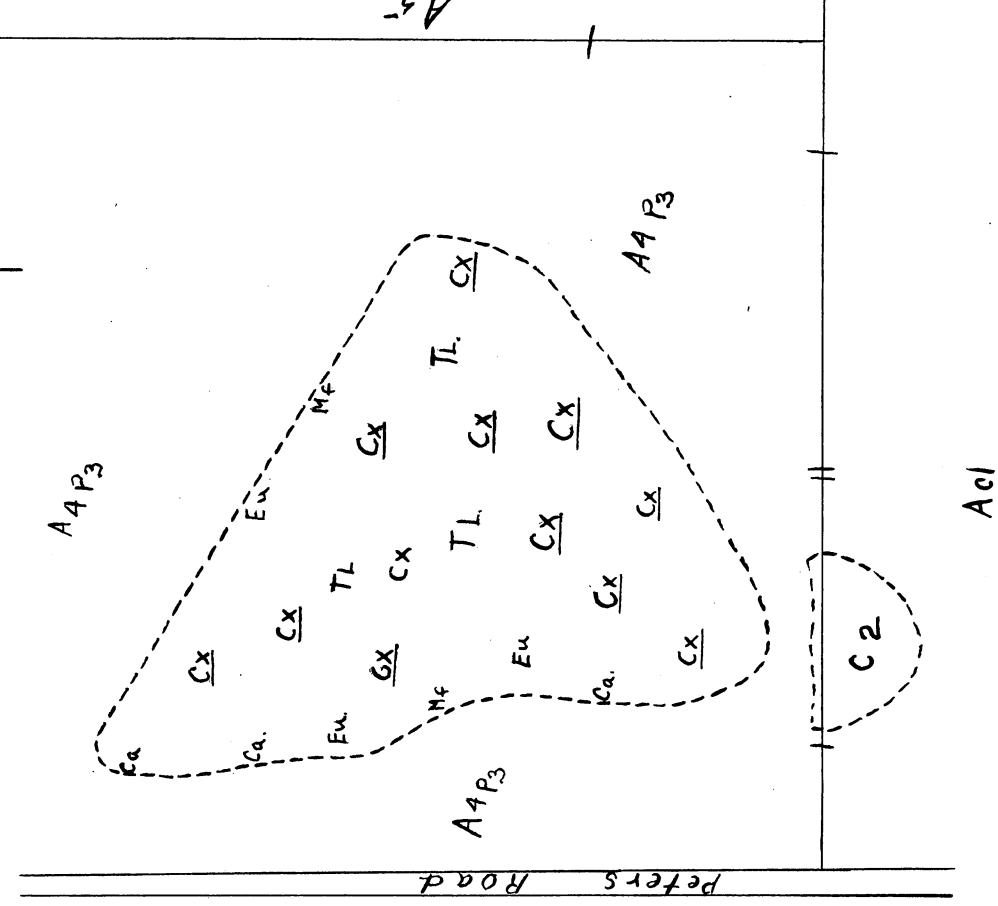
Feces Rabbit, Pheasant
Dens none in marsh - 1 skunk in adjacent CI type.
Tracks Pheasant, Rabbit
Other signs Rabbit fur - Hawk feathers.

Owners value Thinks it fine corn land.
Notes Adjacent swamp formerly Aspen, Elm + red
maple taking over during past 15 years. No human
disturbance in this part of area. Marsh not posted
Usenelly hunted - Good crop results 1940.
14.8 acres pastured.



Scale: 1 inch = 5 chains

No. 2 Twp. Sc 10 S. 10 LOC. SW 1/4
 Date November 20, 1939
 Plo. No. — Area: — chs. x — obs. 3.84 Ac.
 Type classes B5
 Pres. Use Pasture
 Past Hist. Approximately the same for last 20 years. Has burned occasionally but not for the last 2 years. Always pastured.
Terminal moraine of Huron Erie lobe - Small lake basin.
 Former size 8 X 7 X 9 Chains
 Use trend Continued grazing
 Soil type Houghton Muck pH 5.3
 Vegetation: Dom. Carex lascastris Codom. None
 Assoc. so. Bensset, Cat-tail, Canada thistle, Wild Bergamot
 Food: Quant. 11.25 Qual. 0
 AV. 15.40
 Cover: H. 28.90 D. 31.05 S. 23.37
 Concealment: Hor. 62.28% Vert. —
 Surrounding Land: Des. Rolling AAPj Acl.
 Food: Quant. 11.00 Qual. 22.00
 AV. 22.00 Dist. 25 chains to Serath
 Dist. to Suitable cover 1/2 ch to C2; otherwise 18 ch to N
 Grazing: Type and Intensity: Past 40 Sheep - 3 mo (Unit per 2.89 ac) Pres. 45 Sheep - 3 mo (1 unit per 2.57 Ac.)
Effects on veg. slight trampling
on game hab. Continuity of cover reduced by trampled spots.
 Weather con.: Marsh 6", 20%, 18° BH - 14", 13° 2" Show High wind
 Surrounding Area 6" - 9", 8° BH - 8", 6° Drifting snow, High wind
 Imm. past gen. light show, High winds Temp well below 20°
 Wildlife: observed
 census
 Feces Pheasant (5 spots)
 Dens 1 bird nest
 Tracks Pheasant
 Other signs 3 dusting spots on edge.
 Owners value Very little - would prefer it to be upland.
 Notes No water or flooding - evident - good natural drainage
Land not pestered - Hunted last season. Don't know how many birds killed. Burns to remove old vegetation for sheep - 3 yr intervals.
23.19 acres in the pasture.



Scale - 1/2 inch = 1 chain

Date Nov. 22, 1939
 No. 3 Twp. Ann Arbor S. Loc. NW 1/4 AC.
 Pto. No. Area: Chs. X chs. 2.8
 Type classes B-4-7
 Pres. Use None
 Post list. Ground moraine
Shallow open ditch put in in 1939 - not completely satisfactory
No burning or grazing known to have been done
Dr. Th. S. Ar. S.
Former size probably connected to #4 and extended 3-4 chs. to NE
Use trend To agriculture if area dries out sufficiently.

Soil type Brockstone Loam pH 5.9
 Vegetation: Dom. Typha latifolia CoDom. Carex lasucris
 Assoc. So. Eu. Mt., Ps., Ca., Dc., Sa., Vh., Bc., Sp., Apy, E.

Food: Quant. 12.44 Qual. 0
 Av. 18.96

Cover: H. 27.84 D. 28.79 S. 21.22
 Concealment: Hor. 65.50% Vert. 39.00

Surrounding Land: Des. Rolling upland - pasture & agricultural
 Food: Quant. 26.38 Qual. 39.00
 Av. 29.42 Dist. Adjacent field & fence rows.

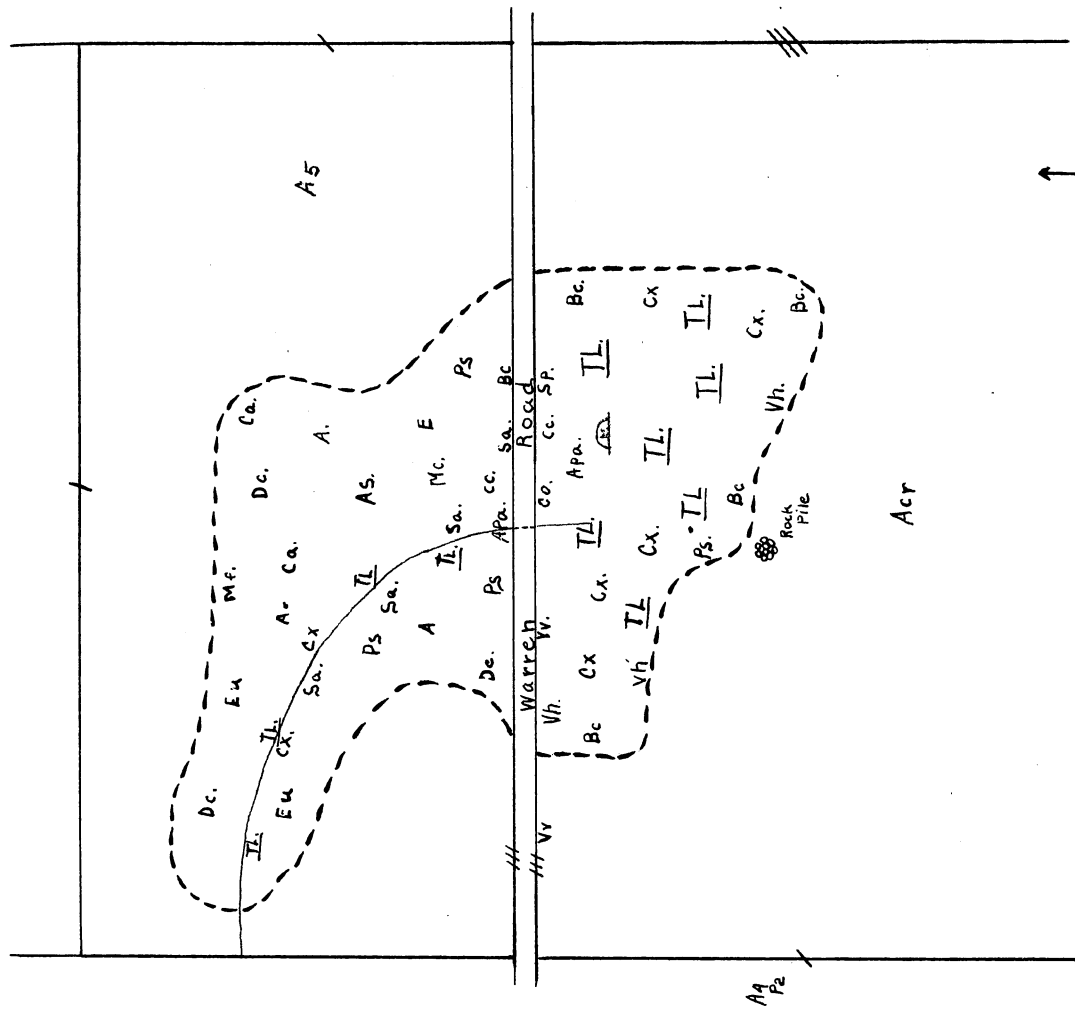
Dist. to Suitable cover 3 chains
 Grazing: Type and Intensity: Past None
 Pres. None

Effects on veg. _____
 on game hab. _____

Weather con.: Marsh 6"-41% B.H.-38% Cloudy-Vt. Wind
 Surrounding Area 6"-38% B.H.-36% " " "
 Imm. past gen. Cold and cloudy
 Wildlife: observed Song sparrow, Gray fish, Mallard
 census _____

Feces Quail (several), Weasel on rock pile.
 Dens 1 Muskrat house in use
 Tracks Muskrat, Quail on edge, Weasel
 Other signs _____

OWNERS value Useless in present condition unless drainage allows planting
 Notes Land posted - Soil very moist, occasionally water
evident in low spots. Drainage not completely satisfactory.
2/16/90 - Completely covered by snow; practically no food or cover.
No hunting



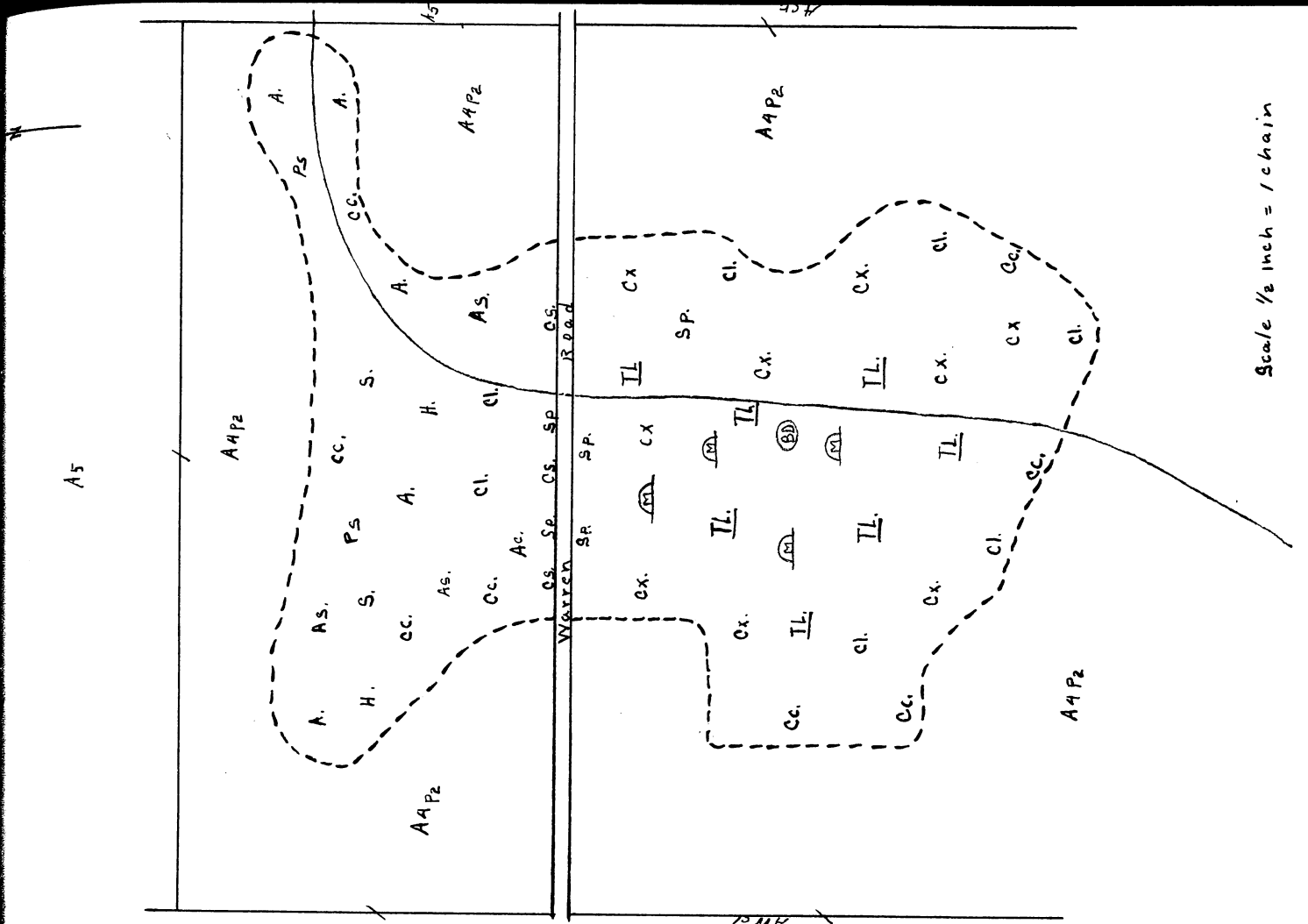
Scale 1/8 inch = 1 chain

No. 4 Twp. Abh Arber S. 10 Loc. NW 1/4
 Sec. No. Area Chs. 3.9 Chs. 3.9 A.C.
 Type classes BA-Z
 Use Pasture
 Post list. Ground Marine

Surrounding area pastured for many years. Drainage ditch put in during summer of 1939. soon stopped up. Very little change yet
Former size probably connected with #3 and extended 30-40 chs. to S.W.
Use trend will apparently continue to be used as pasture - extent of use will be determined by effectiveness of drainage
Soil type BreeKstone loam pH 5.9
Vegetation: Dom. Typha latifolia Codom. Carex spp.
Accso. 30. Ps. Cs. Sp. A, As, S, H, Csy

Food: Quant. 12.35 Qual. 0
 Av. 8.73
 Cover: H. 21.62 D. 26.38 S. 20.68
 Concealment: Nor. 88.26 % Vert.
 Surrounding Land: Des. Rolling to flat, Ag. Pasture, & Swamp (SW)
 Food: Quant. 26.38 Qual. 33.00
 Av. 29.42 Dist. 2 chains
 Dist. to suitable cover 3 chains
 Grazing: Type and Intensity: Past 8-10 cattle for at least 6 years (1.5 to 1.9 ac.) Pres. 8 cattle - 3 mo. (1 unit per 1.88 ac.)
Effects on veg. Slight trampling in dryer portions & around edges on game hab. Concealment slightly reduced in spots.
Weather con.: Marsh 6"-36". BH-35% Ice on area. Cloudy
Surrounding Area 6"-39". BH-35% No ice. cloudy
Imm. past gen. Cloudy-light wind - freezing or just above
wildlife: observed 2 Black Ducks. Pheasant 3 ♀
census

Feeds 9 groups of pheasant in dry portions, Muskrat
Dens 4 Muskrat dens in use.
Tracks
Other signs
Others value Very little in present condition
Notes land pasted - Water & ice on 75% of area - Sept. 29"
Drained so that cattle could use area. So far too wet to herd.
Used as source of water for cattle while on area. 2/16/39 - completely covered with snow, he feed or cover available. 3/23/41 - 5/2 flooded above vegetation. Don't bother to trap. Trapped by resident of Abh
No hunting 15.1 acres in pasture.



Scale 1/2 inch = 1 chain

No. 5 Twp. Ann Arbor S. Date November 26, 1939
 File No. Area 4 Loc. SW 1/4
 Type classes chs. Chs. 9.6
 Use pasture
 Past Dist. Glacial Outwash

Condition about the same for the past 40 yrs. Has always been used to pasture 14-20 cattle during this time. Open ditch drainage for at least 50 years. Ditch size practically the same as at present Use trend Pasture

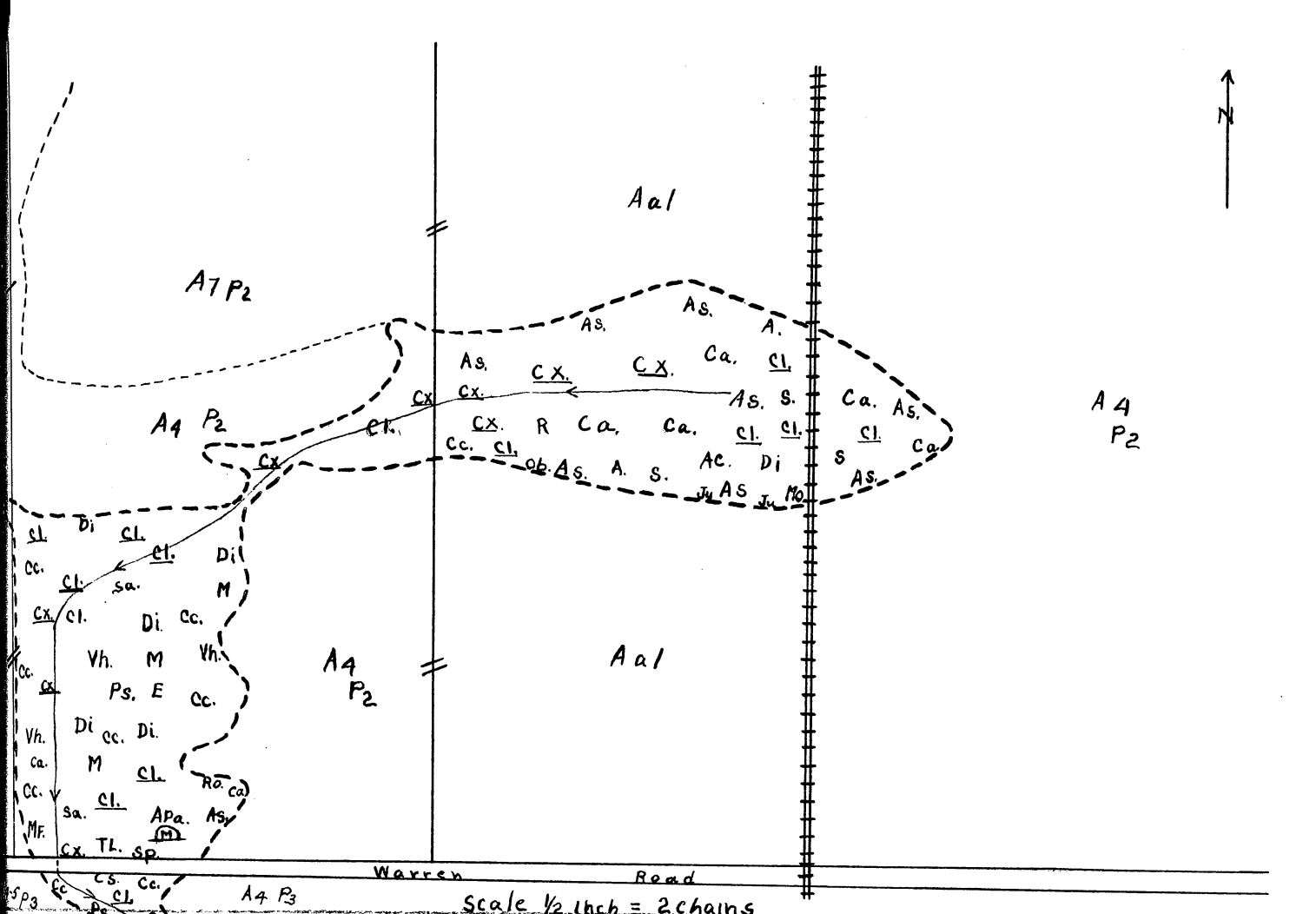
Soil type Carlisle Muck pH 6.9
 Vegetation: Dom. Carex spp. Codon. Calamagrostis canadensis
Assoc. so. Sa., s., Vh., F., As., Bo., A. Apa., Ca., Di., Il., Ps., M.

Mf. Cs., Ob.
 Bond Quant. 9.32 Qual. 11.00
 Cover: H. 13.26 D. 29.25 S. 18.52
 Concealment: Hor. 38.36% Verb.
 Surrounding Land: Dos. Rolling upland - Pasture, woodlots, & Ag.
 Flood: Quant. 12.44 Qual. 22

Dist. 20-25 chains
 Note: to suitable cover Approx. 18 chains
 Grazing: Type and Intensity: Past 14-20 cattle, May-Sept. Past 40 years.
 Press. Cattle may to Sept, 1939 (low per. 69 ac)
 effects on veg. medium grazed & heavily trampled on game hab. Concealment considerably reduced
 Weather con.: Marsh 6-48° BH-45° Clear + light wind
 Surrounding Area: 6"-45° BH-44° "
 Tam. past gen. Clear + windy, ho show, temp. in 90s
 Wildlife: observed 1 Rabbit
 census

Notes: Muskrat (3) Weasel (6) Skunk (2), Rabbit
Dens 1 old muskrat house, 1 Bird nest
Tracks Weasel, muskrat, Skunk, Rabbit
 Other signs: Pheasant feather.

Owner's value Has no idea of value.
 Notes: Land Pested - drainage to S.E. No water
Present when mapped, Marsh not used as a source
of water for cattle. Occasional burning for stock.
3/23/91 - Ditch partially stopped up; musk ice area about 1/3 of the
area. No hunting permitted. 20.3 acres in pasture.



No. 6 TWP. Webster S. 15 Loc. SE 1/4 AC.
 Plo. No. Area: x chs. 1, 2
 Type Classen B4-5
 Pres. Use None
 1936 Hist. Ground Meraine

Grazed by 6-8 cattle during summer months up to 1932. Has been lying idle since that date

Former size Approx. the same as at present
 Use trend Will probably lie idle under present ownership - possibility of it being pastured

Soil type Houghton Muck pH 6.9
 Vegetation: Dom. Carex lacustris Codom.
Scirpus, so. Typha, Scirpus a., Phragmites, Carex lanuginosa,
Calamagrostis, Verbena, Solidago, Carex lurida
 Food: Quant. 11.61 Qual. 0.00

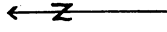
AV. 26.91
 Cover: H. 25.40 D. 32.44 S. 24.92
 Concealment: Hor. 98.28 Vert.
 Surrounding Land: Des. Practically flat - 1/2 ch, Agr - 1/4 ch, A. and pasture

Food: Quant. 30.36 Qual. 33.00
 AV. 31.54 Dist. corn 1/4 ch, wild seeds 1 ch
 Dist. to Suitable cover 10 chains (crossing)
 Grazing: Type and Intensity: Past 6-8 cattle - 3 hrs.

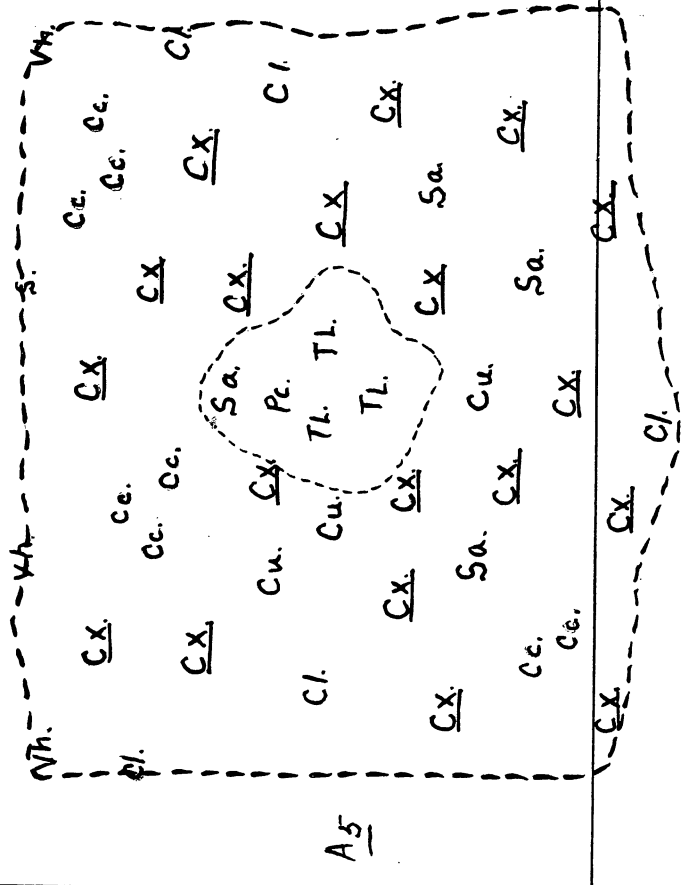
Effects on veg. None
 on game hab. No evident effects of past grazing.
 weather con.: Marsh 1" - 28°, 26° BH - 24°, 21° clear no wind
 Surrounding Area 6' - 20°, 19° BH - 19°, 18°
 Imm. past gen. Clear + cold, no wind or snow
 Wildlife: observed Pheasant 2 ♂ + 1 ♀
 census

Feces Pheasant
 Dens None
 Tracks Mice
 Other signs

Owners value Only value lies in its attractiveness to birds.
 Notes land posted - No hunting permitted. No birds killed in area for several years. No water present but very moist in center. No burning since 1932 because not using pasture. Stopped pasturing because got rid of cattle.



A5



A5

A5

C3

Scale 1 Inch = 1 chain

Date Feb 8, 1940

No. 7 Twp. Sci O S. 2822333 Loc. Junction

Plo. No. Area: chs. X chs. 187.72 Ac.

Type classes B5-86-87

Pres. Use Pasture and trees

Past Hist. Ground Meraine - High water table

Open ditch put in at least 20 years ago last clearing about

3 years ago. Area drying up, making cultivation possible

Former size Probably originally included present swamp areas.

Use trend slight trend toward cultivation particularly of the

drier parts.

Soil type Carlisle Muck pH 7.0

Vegetation: Dom. Carex lasiocarpis Codom. Grasses

Assoc. so. Vh, S, Sp, A, Vt, P, Ps, J, Ju, Cp, Di, R, Sx, B, E,

Mc, Pk, ch, Sa, Sv, Il, Cc, As

Food: Quant. 8.54 Qual. 11.00

AV. 19.80

Cover: H. 12.93 D. 29.92 S. 17.26

Concealment: Hor. 36.22 Ver. 70

Surrounding Land: Des. Flat to slightly rolling Ag. and pasture.

Food: Quant. 22.00 Qual. 33.00

AV. 22.00 Dist. Within 15 chains of edge

Dist. to Suitable cover Adjacent swamp et 10 Ch. to South,

Grazing: Type and Intensity: Past Practically the same as

at present Pres. 75 Sheep - 26 cattle - 1 deer (Unit per 688 Ac)

Effects on veg. closely grazed over much of the area,

on game hab. Really suitable cover present only in spots.

Weather con.: March 6 - 36° 37° B.H. 30° 30° 6" snow

Surrounding Area 6" - 28°, 27° B.H. 26°, 25° 4" snow

Imm. past gen. 4" Snow - snowing - light wind - 30° Ag

Wildlife: observed Quail 8, Pheasant 1,

census

Reces Pheasant, Rabbit.

Dens

Tracks Rabbit (N), Pheasant (O), Quail (spot, edge)

Other signs

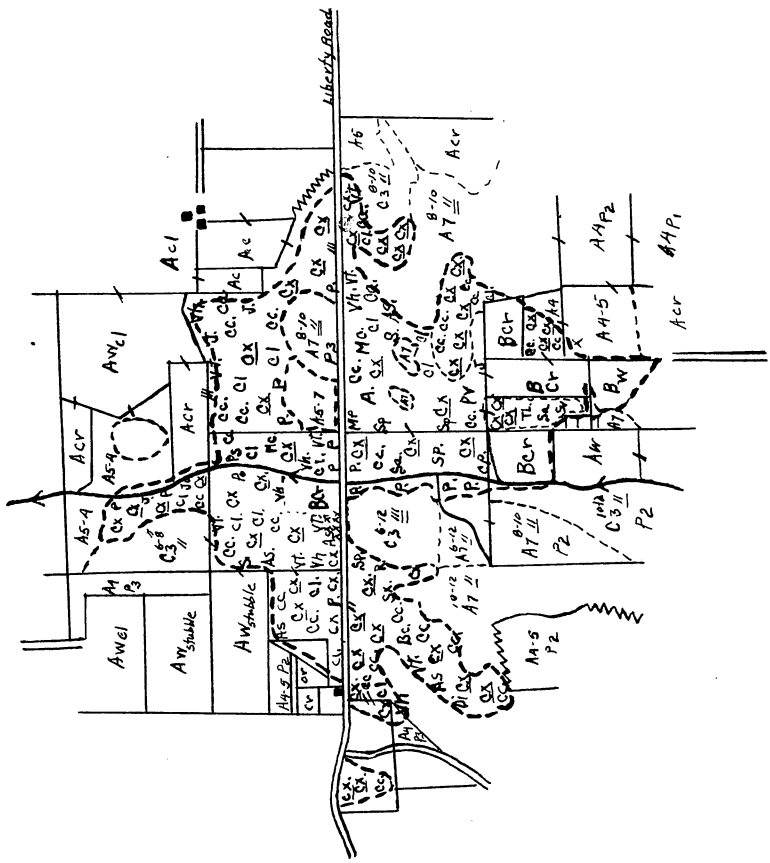
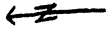
Owners value thinks it fairly good pasture & good cow land

Notes No water or ice evident, drainage ditch

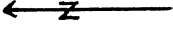
operating satisfactorily. land posted - hunt with permission

282.2 ac in pasture. Crops good

Occasional burnings of certain parts.



Scale 1 inch = 28 chains



No. 8 Twp. Scio S. 18 Loc. NE 1/4
 Date Feb. 10, 1940
 Area: chs. x chs. 44.80 Ac.

Type classed B1
 Pres. Use Pasture
 Past Hist. Glacial Outwash

Pastured for past 15 years - open ditch drainage
 put in about 30-35 years ago. Bucks occasionally to
 remove old vegetation - light burn spring 1940.
 Former size approximately the same as today.
 Use trend probably will remain in pasture.

Soil type Carlisle Muck pH 7.0
 Vegetation: Dom. *Galium aparine*, *Coarctatus*, *Codrom.*, *Carex longuinea*,
 Assoc. so. *Vh.*, *S.*, *A.*, *Cx.*, *As.*, *Th.*, *Cs.*, *Cp.*, *Sa.*, *Mf.*, *Ps.*, *E.*, *P.*, *Es.*

Pk., *Vt.*, *Ca.*
 Food: Quant. 10.25 Qual. 22.00
 AV. 12.40
 Cover: H. 20.28 D. 29.44 S. 15.22
 Concealment: Hor. 60.00 2a Vert.

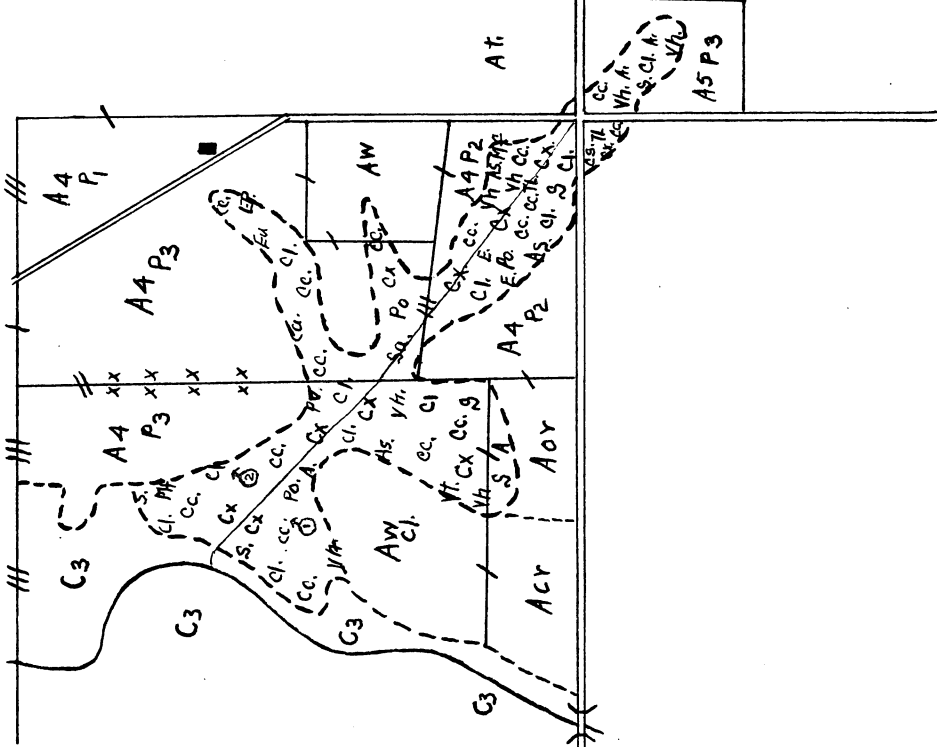
Surrounding Land: Des. Rolling pastures, Ag, and creek bottom
 Food: Quant. 22.00 Qual. 39.00
 AV. 22.00 Dist. 12-20 chains

Dist. to Suitable cover 20 chains
 Grazing: Type and Intensity: Past 8-12 cattle (low per 15.1
 to 10.1 acres) Pres. 9 cows (low per 13.99 ac.)
 Effects on veg. slight grazus - medium amount of trampling
 on game hab. Cons reduced from trampling - hummocky in spots
 Weather con.: Marsh 6'-28" B.H. - 2.50 9" Snow - 1. Wind
 Surrounding Area 6"-21" B.H. - 2.00 " " " "
 Imm. past gen. Snow with light wind - Avg. temp 30°
 Wildlife: observed 3♂ pheasants
 census 4♂ and 7♀ pheasants with dog.

Feces Pheasant (N), Rabbit.
 Dens

Tracks Rabbit, Mice, pheasant
 Other signs

Owners value
 Notes Water in central drainage ditch only (frozen)
 land pasted but can hunt with permission. Rabbits and
 pheasants hunted in area 1939 but don't know how many taken off
 Mr. Ahly Feeding 10-12 birds on marsh edge
 12.9 ac. in pasture



Scale 1 inch = 13.3 Chains

Date Feb. 11, 1940

No. 9 Twp. Sciog S. 19 Loc. SW 1/4
Pic. No. Area: --- chs. x --- chs. 60.98 Ac.
Type classes B5-7

Pres. Use Pasture
Past Hist. Ground Merginc - low undrained area
Ditched 45 years ago - proved unsatisfactory and was
allowed to fill up completely. Small portions of the
northern part burned occasionally (April 1931).
Former size Swamp area encroaching upon marsh.
Use trend to remain in pasture or lie idle depending upon water
conditions

Soil type Carlisle Muck & Miami Loam pH 6.9
Vegetation: Dom. Carex lacustris. Codom. Nans
Assoc. so. Cl., J., Ph., Il., C., B., E., Vh., A., Vt., Ca., Mg., Sx,
Cs., Cp., S., Sa., As., Pa., Ob., Se.

Food: Quant. 10.28 Qual. 11.00
Av. 9.45
Cover: H. 28.65 D. 31.16 S. 30.08
Concealment: Hor. 82.65 % Vert.

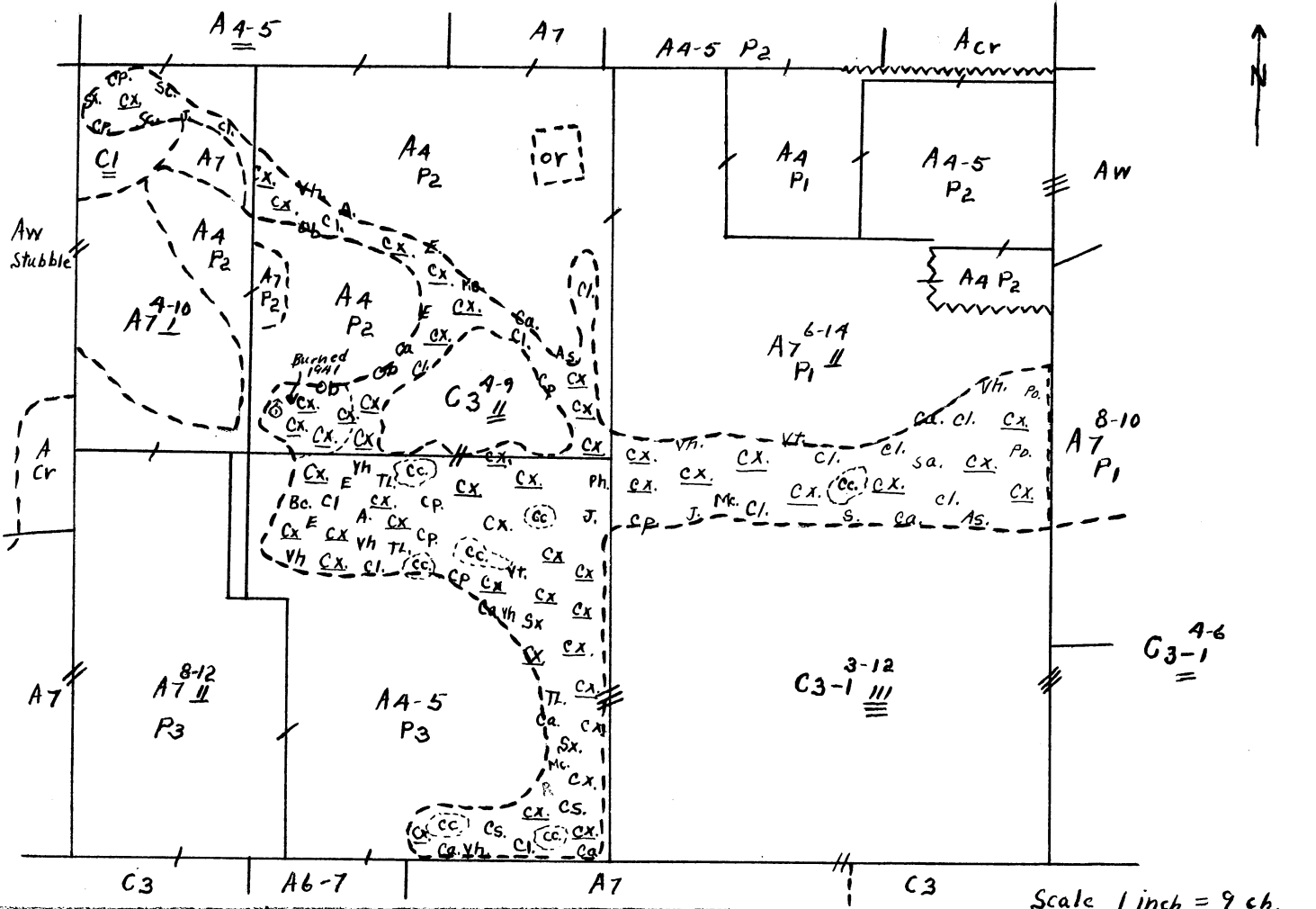
Surrounding Land: Dec. Flat pasture & wooded, little Ag.
Food: Quant. 22.00 Qual. 33.00
Av. 22.00 Dist. 0-10 chains

Dist. to Suitable cover 6 chs. to B6. Swamp adjacent.
Grazing: Type and Intensity: Past same for past

12 Years Pres. 16 Cattle & 45 Ewcs. (Unit per 6.20 Ac.)
Effects on veg. Slight evidence of grazing in northern part only
on Game hab. Cover & concealment very good for a fastured marsh.
Weather con.: Marsh 6'-37" B.H. - 35% 12" Snow Clear
Surrounding Area 6'-34" B.H. - 33% " " "
Imm. past gen. Snow & cloudy - light wind - avg 30%
Wildlife: observed Pheasant (10), Rabbit
census

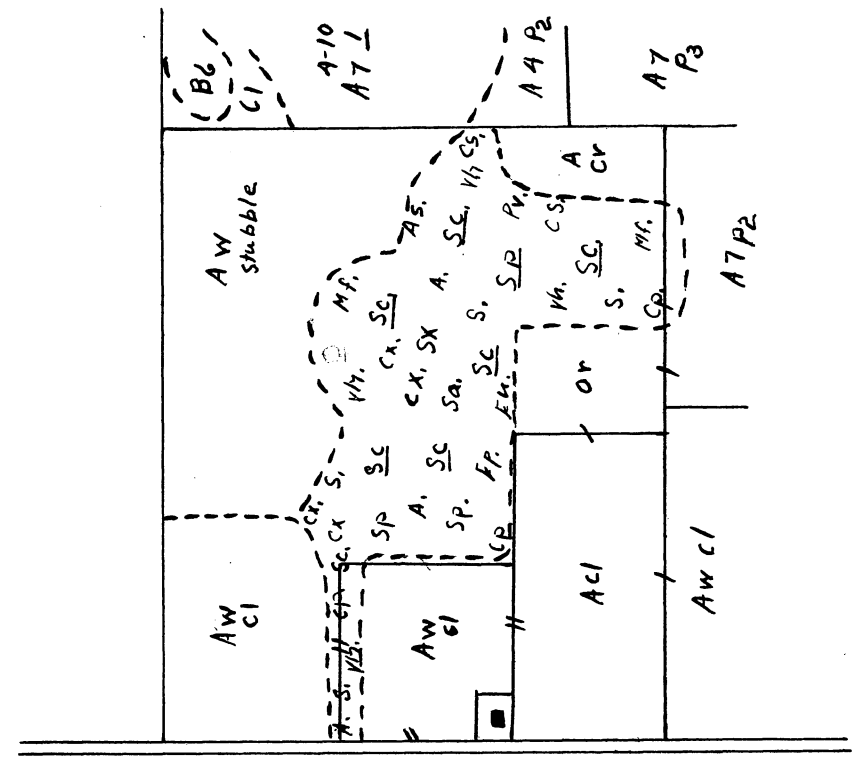
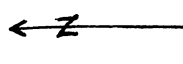
Feces Mice, Pheasant
Dens Sns. bird nest
Tracks Rabbit Mice
Other signs Rabbit damage to dogwood

Owners value Pays \$30 per year rent for 60 Ac.
Notes Not posted - hunting permitted ~~for 60 Ac.~~
Pasturing impossible until late July because of water
Water up to 2 1/2 ft. in places. (April 1931)
155 acres pastured



Scale 1 inch = 9 ch.

No. 10 Twp. Scio S. 19 Loc. SW 1/4
 Plo. No. Area: chs. x chs. 14.72 Ac.
 Type classes B1 & B8
 Pres. Use None
 Past Hist. low drained area in ground to remain
Natural drainage only since no use made of
marsh. Not burned. More shrubs during recent
years.
 Former size Probably originally connected to similar area 1500 SW
 Use trend No use under present ownership. Not used by
previous owner. No use planned for this marsh.
 Soil type Carlisle Muck & Brookstone loam PH 6.9
 Vegetation: Dom. Sambucus canadensis Codom. spiraea alba
ASSOC. SO. CS, CP, SX, AY, YH, SY, SA, CY, EX, PY, EP,
AS.
 Food: Quant. 12.21 Qual. 22.00
 AV. 15.47
 Cover: H. 33.00 D. 32.46 S. 30.25
 Concealment: Hor. 96.35 To Vert.
 Surrounding Land: Des. Slightly rolling Ag. 4 patches woodlots
 Food: Quant. 22.00 Qual. 22.00
 AV. 33.00 Dist. 10 chains
 Dist. to suitable cover 9 ch. to B6 type, 6 1/2 ch. to Cl.
 Grazing: Type and Intensity: Past None
 Pres. None
 Effects on veg. _____
 on game hab. _____
 Weather con.: Marsh 6" 18° Bth. 15° Clouds & winds
 Surrounding Area 6" 10° Bth. 9° "
 Imm. past gen. show and cold - light wind
 wildlife: observed 1 P pheasant, 1 Marsh hawk
 census _____
 Feces Pheasant, Rabbit, Hawk
 Dens _____
 Tracks Rabbit, Pheasant
 Other signs _____
 Owners value Practically none in present condition
 Notes Posted land. Hunting permitted - pheasants
killed in marsh during season of 1920. but
owner does not know how many removed.
Natural drainage fairly good and base completely
flatted for this period in spring.

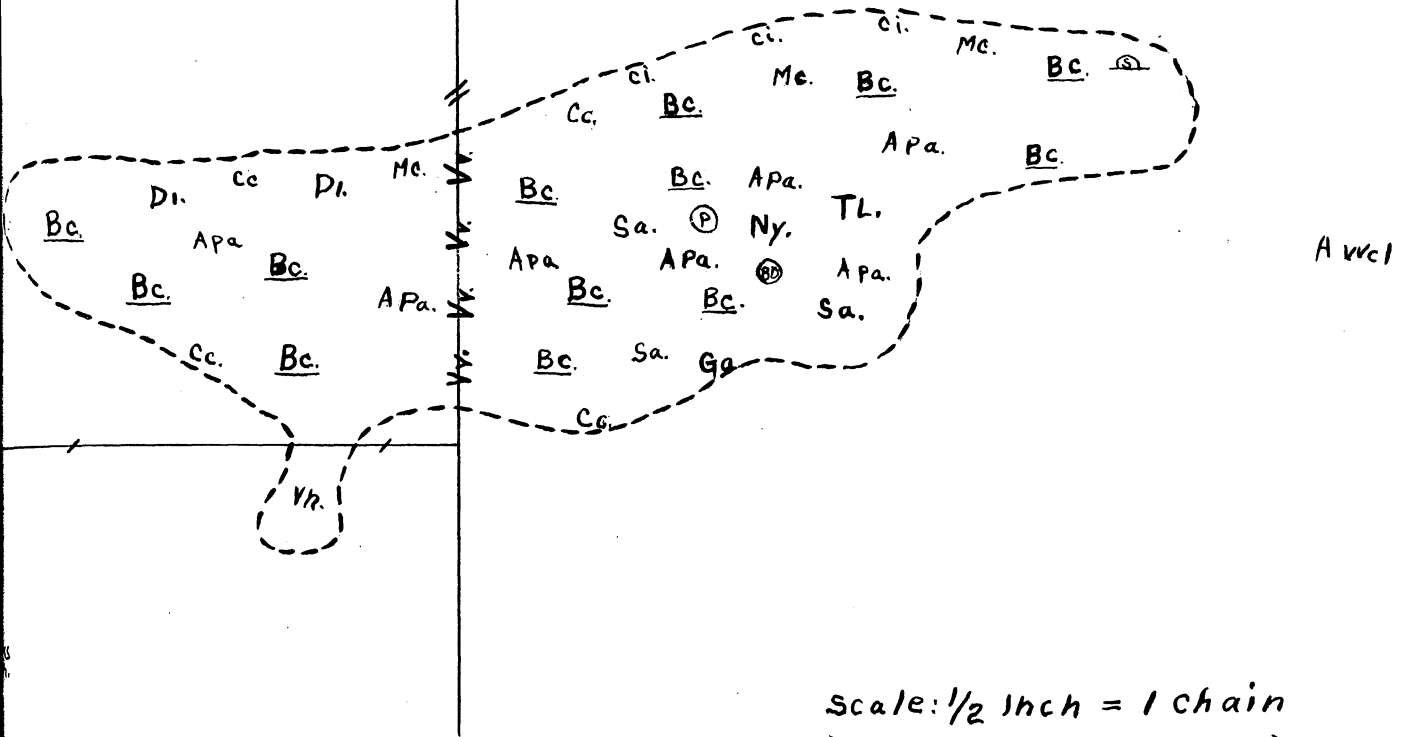


Scale 1 Inch = 9 chains



AW
stubble

AWc1



Scale: 1/2 inch = 1 chain

No. 11 Twp. Lodi S. 12 Loc. NE 1/4
 Sec. No. 2 Area chs. x chs. 3.0 Ac.
 Type classes B7
 Pres. Use Xene
 Past Hist. Glacial lake bed - Terminal moraine - kettle type
No attempt to drain or burn this area so far as is known

Former size Very little recession of vegetation into bottom
 Use trend Apparently will continue to remain idle since
adjoining land is not pastured at all
 Soil type Carlisle Muck pH 6.9
 Vegetation: Dom. Bidens cernua Codom. Water plantain
 Assoc. So. Gay, Ny, Cey, Thy, Di, Me, Vr, Yb, Ci,

Food: Quant. 18.36 Qual. 22.00
 Av. 21.42

Cover: H. 28.63 D. 24.33 S. 29.14
 Concealment: hor. 84.25% vert.

Surrounding Land: Des. Generally telling agricultural
 Food: Quant. 22.00 Qual. 22.00
 Av. 22.00 Dist. 4-8 chains

Dist. to Suitable cover 10-12 chains
 Grazing: Type and Intensity: Past None
Pres. None

Effects on veg. _____
 on game hab. _____

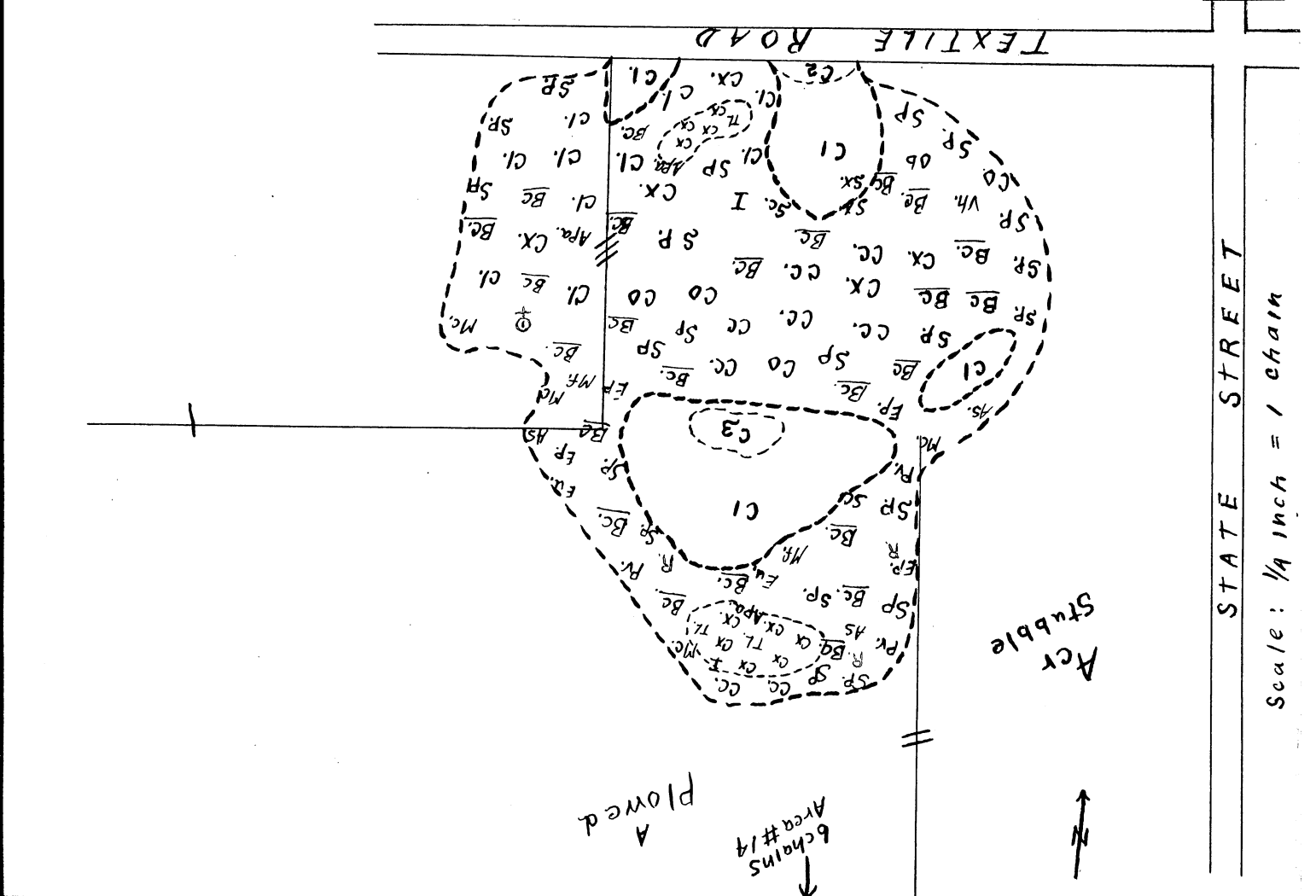
Weather con.: Marsn 6"-36L, 21° B.H. - 34L, 18° 6" Snow
Surrounding Area 6"-30L, 10° B.H. - 30L, 9° 4" Snow
 Imm. past gen. Clear - Show no ground - light wind, 30° W
 Wildlife: observed 1 Black Duck, 2 Pintails
 census _____

Feces Weasel
 Dens Skunk
 Tracks Skunk, Weasel, pheasant, Quail
 Other signs _____

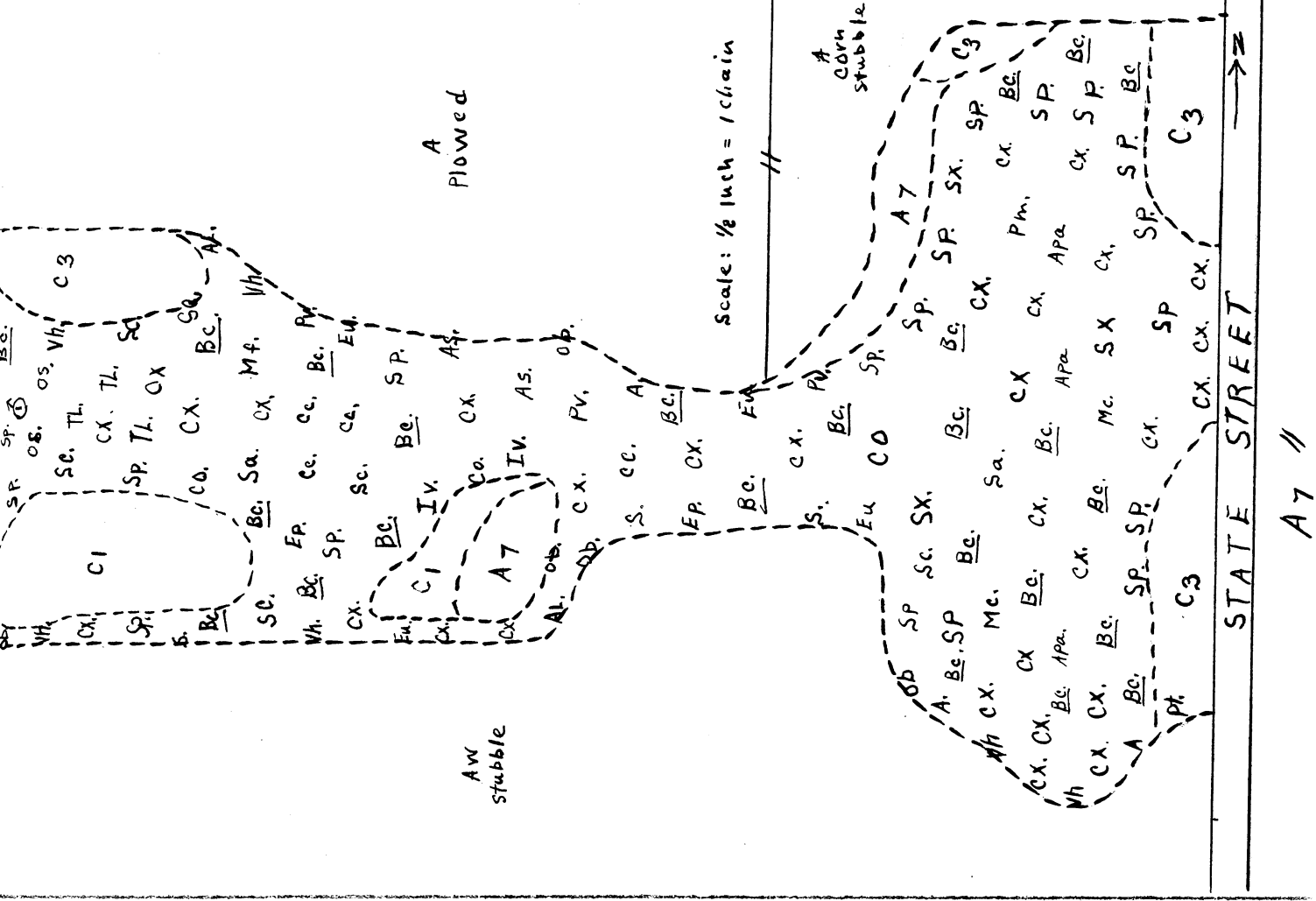
Owners value None
 Notes No water present during the winter but completely
flooded during the spring. No burning in this area.

Section posted by Detroit Sportsmans Organization

No. 13 Twp. Pittsfield S. 28 Loc. XW/4
 Pto. No. Area: chs. I chs. 12.7 Ac.
 Type classes B7-5
 Pres. Use None
 Past Hist. Undrained area in Terminal moraine
Not pasturing or burning - drained by tile
for last 20 yrs. Area has had no hunting
by any one
 Former size Depression soils distinct - apparently little change.
 Use trend To be hunted for a small fee next year
Not planning to cultivate or pasture.
 Soil type Greenwood Peat pH 6.4
 Vegetation: Dom. Bidens cernua Codom. Spizaea alba
 Assoc. so. CX, Cl, I, I, A, C, E, E, F, A, S, M, M, F.
 P.V. Co. SX, SS.
 Food: Quant. 12.36 Qual. 22.00
 Av. 20.40
 Cover: H. 32.24 D. 29.80 S. 30.13
 Concealment: Hor. 80.54% Vert. ---
 Surrounding Land: Des. Rolling Agricultural
 Food: Quant. 33.00 Qual. 33.00
 Av. 33.00 Dist. 5 ch. to where feeding.
 Dist. to Suitable cover 6 chains.
 Grazing: Type and Intensity: Past None
Pres. None
 Effects on veg. ---
 on game hab. ---
 Weather con.: Marsh 6" - 38% B.H. 2" Snow V.W. Wind
 Surrounding Area 6" - 35% B.H. 1" " V.W. Wind
 Imm. past gen. 4" Snow previous night - L. Wind - 30% dis.
 Wildlife: observed Rabbit - 3, Pheasant
census 7 ♂ pheasants, 11 ♀ pheasants with dog.
 Feceas Rabbit, Pheasant
 Dens ---
 Tracks Rabbit (N), Pheasant (N), Skunk, opossum.
 Other signs ---
 Owners value ---
 Notes Pested land - No water - Won't burn
because would destroy soil. No hunting permitted
Flock of 20 birds in marsh - Feeding across road
around farm buildings.



No. 14 Twp. Plattsfield S. 28 & 29 Loc. E.F. WEAVER'S RESERVE
 Plat. No. Area chs. x cont. 7.6 AC.
 Type classes B7
 Pres. Use None
 Past Hist. Ground Moraine - High water table.
Tile drain put in about 70 years ago. Area has never
been cultivated, grazed or burned since that time.
Also he hunting as far as the owner knows.
 Former size About as at Present
 Use trend No use of any type during past. Will probably
be hunted for small fee next season.
 Soil type Greenwood peat & Breckstone clay loam pH 6.1
 Vegetation: Dom. Bidens Cereus Codom. Carex lacustris
 Assoc. so. Sp. Ss. Co. Ivy. Aly. Pm. Apa. Pv. Vh. A. Ob.
Sy. Ev. E.P. Os. As. Sx.
 Food: Quant. 14.30 Qual. 22.00
 AV. 17.65
 Cover: H. 31.26 D. 27.31 S. 31.41
 Concealment: Hor. 78.15% Vert.
 Surrounding Land: Des. Rolling Agricultural.
 Food: Quant. 22.00 Qual. 22.00
 AV. 22.00 Dist. Approx. 11 chains to north.
 Dist. to suitable cover 6 ch. to area #13, or adjacent swamp.
 Grazing: Type and Intensity: Past None
 Pres. None
 Effects on veg.
 on game hab.
 Weather con.: Marsh 6" - 34% B.H. -29% Light wind 2" snow
 Surrounding Area 6" - 29% B.H. -28% Light wind 2" snow
 Imm. past gen. 4 of Snow previous light - E. Wind - 30% dry.
 Wildlife: observed Pheasant 1%
 census
 Feces Pheasant, Rabbit
 Dens 6 Rat houses
 Tracks Rabbit (N), Pheasant (N), Skunk for Squirrel, Mice, Opossum.
 Other signs
 Owners value
 Notes Posted land - Some ice on area
Drainage not as efficient as that of #13
Went burn because would destroy soil
Bird signs less numerous than in #13
Hunting prohibited.

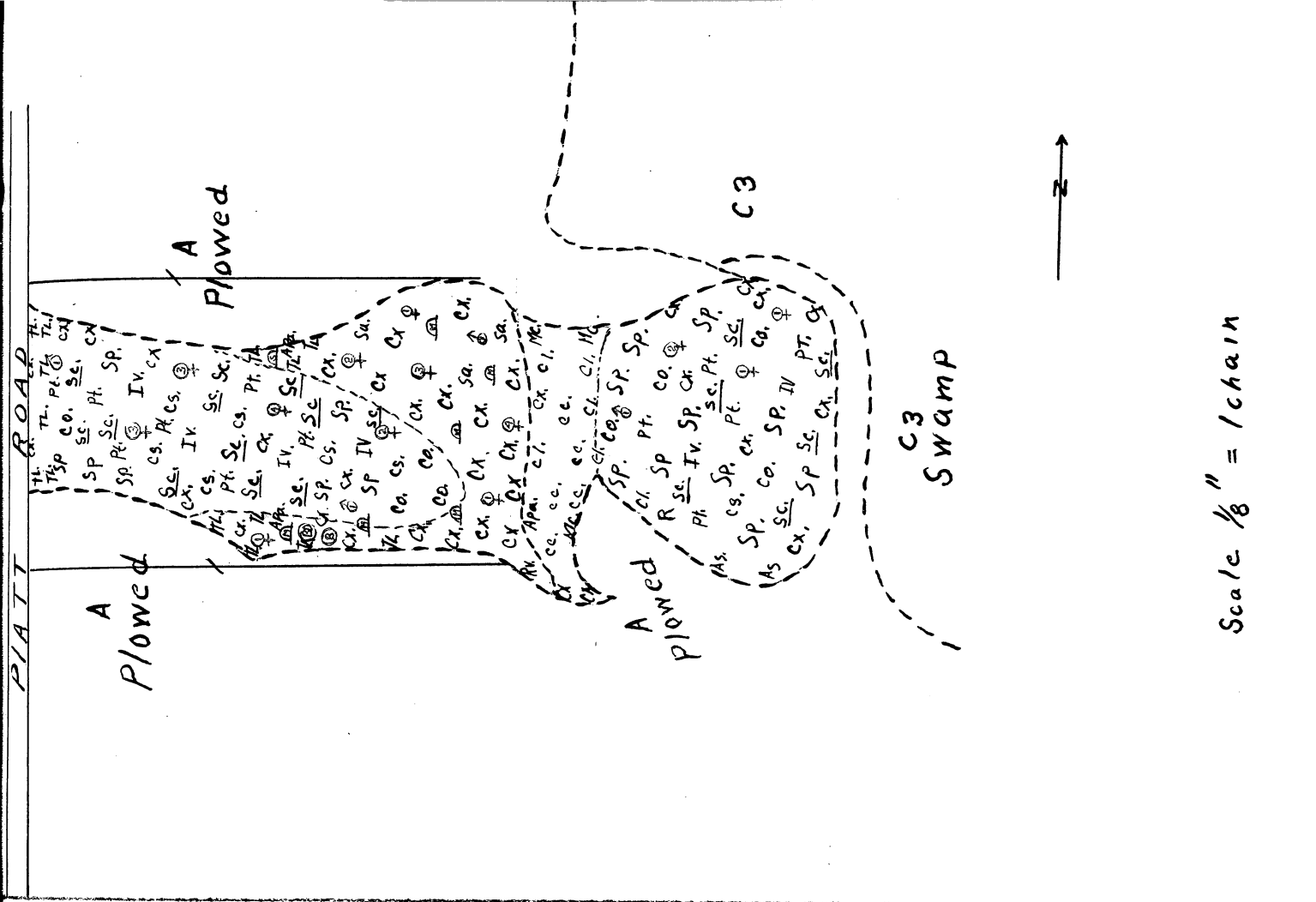


No. 15 Twp. Atfield S. 35 Date Feb. 24, 1940
 P.L.C. No. Area: chs. x chs. 35 x 5 Loc. SW 1/4
 Type classes B8 - 6 -
 Pres. Use None
 Past Dist. low undrained Area in Ground Moraine
No activity of any type on this area in the memory of local residents. Property owned by State in connection with State hospital. This information from former living nearby. Former size Sedge marsh passing into more advanced stage. Basin same. Use trend Apparently will continue to be idle.

Soil type Rifle Peat pH 6.9
 Vegetation: Dom. Elderberry Codom. Carex leucostri
 Assoc. so. Il, Sa, Cl, Cs, Sp, Co, Iv, Rv, Mc, Pt, Aps, As.
 Food: Quant. 15.75 Qual. 22.00
 Av. 19.66
 Cover: H. 31.48 D. 32.80 S. 33.00
 Concealment: Hor. 94.60 % Vert.
 Surrounding Land: Des. Rolling Ag. & C3
 Food: Quant. 22.00 Qual. 33.00
 Av. 22.00 Dist. 16 chs. to berth
 Dist. to Suitable cover 2 chs. to C3
 Grazing: Type and Intensity: Past
 Pres.
 Effects on veg.
 on game hab.

Weather con.: Marsh 6" - 28° BH - 29° Windy, A" Snow
 Surrounding Area 6" - 22° BH - 20° " " "
 Imm. past gen. clear, cold, and windy
 Wildlife: observed Pheasants 6♀ + 1♂, 1 Rabbit
consus 4♂ and 2♀ Pheasants with deg.
observed. 5/11/41 - Black Duck pair, Bald Pate 3♂ + 1♀.
 Feces Pheasant (N), Rabbit, Skunk
 Dens 6 Rat houses, 1 Skunk den
 Tracks Pheasant, Rabbit, Skunk
 Other signs Rabbit feeding upon shrubs.

Owners value
 Notes land not posted - hunting permitted - Don't know how many birds killed here last season.
Natural drainage only - fairly satisfactory - use in several places. No burning because has no reason to burn. Young poplars seeding into area.

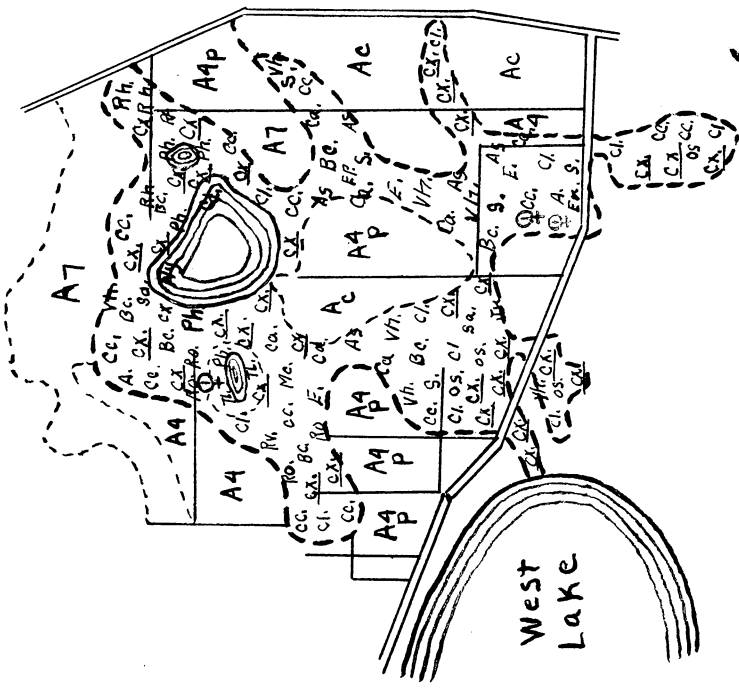


Scale 1/8" = 1 chain

No. 16 Twp. Dexter S. 19-20-29-30 Loc. Interssction
 No. Area: chs. X cns. 206.7 Ac.
 Type classes B6-A
 Pres. Use Pasture
 Past Hist. Glacial lake bed - Terminal moraine
Pasturing begun at least 20 years ago - Has been
continued over the majority of this period. No artificial
drainage
 Former size Basin as today - Marsh on t as lake dries up.
 Use trend Probably will continue as pasture.

Soil type Rifle peat pH 6.3
 Vegetation: Dom. Carex laeustris Codom. Calamagrostis canadensis
 Assoc. Cl., CC., OS., Ss., Il., Ph., Ny., Cd.,
 Food: Quant. 15.38 Qual. 22.00
 Av. 12.55
 Cover: H. 16.88 D. 27.40 S. 15.36
 Concealment: Hor. 64.25% Vert.
 Surrounding Land: Des. Abandoned Ag. & Woodlots (rolling)
 Food: Quant. 22.00 Qual. 22.00
 Av. 22.00 Dist. 12 chains
 Dist. to suitable cover 1/5 ch NE to B6-7, 30 ch SE to D7.
 Grazing: Type and Intensity: Past 12 cattle
(1 cow per 26.9 ac) Pres. 16 cattle - 3 mo. (1 cow per 19.84 ac)
 Effects on veg. Grazed and trampled particularly in dry parts,
on game hab. Cover reduced - Area hummocky
 Weather con.: Marsh 6"-34° B.H. - 30° - Snowy ground - Cloudy - Wind
Surrounding Area 6" - 28° B.H. - 26° " " " "
Imm. past gen. Clear, light wind, Snow on ground 28-30°
 Wildlife: observed Pheasant 3 ♀ Black Duck (2)
 census

Pecces Pheasant - Rabbit
 Dens 1 Rat House occupied
 Tracks Pheasant - Rabbit
 Other signs
 Owners value Pasture leased at \$1.00 per mo. per head.
 Notes Posted Land - Hunting permitted - Small amount
of water frozen over a majority
Pheasants scratchers around small earth hummocks
in sedge type. Occasional burning to remove old
vegetation & improve grazing. 317.5 ac in pasture.



Scale 1" = APPROX. 28 chains

No. 17 Twp. Sci. 9 S. 2 Loc. NE 1/4
 P10. No. 3 Area: Obs. x chs. 15.20 AC.
 Type classes B5
 Pres. Use Pasture
 Past Hist. Ground moraine - Kettle hole type
Open ditch drainage to the north part in at least 80
years ago - never very satisfactory. Area used for pasture
for 20-30 years. Marsh hat burned.
Former size Very little change. Mineral soil eroding into edges
Use trend Apparently to continue to be used as pasture.

Soil type Carlisle Muck pH 7.1
 Vegetation: Dom. Carex lacustris Codom. Calamagrostis Canadensis
 Assoc. So. TL, Vh, Mc, Bc, VI, Ca, Pi.

Food: Quant. 10.14 Qual. 11.00
 AV. 12.52

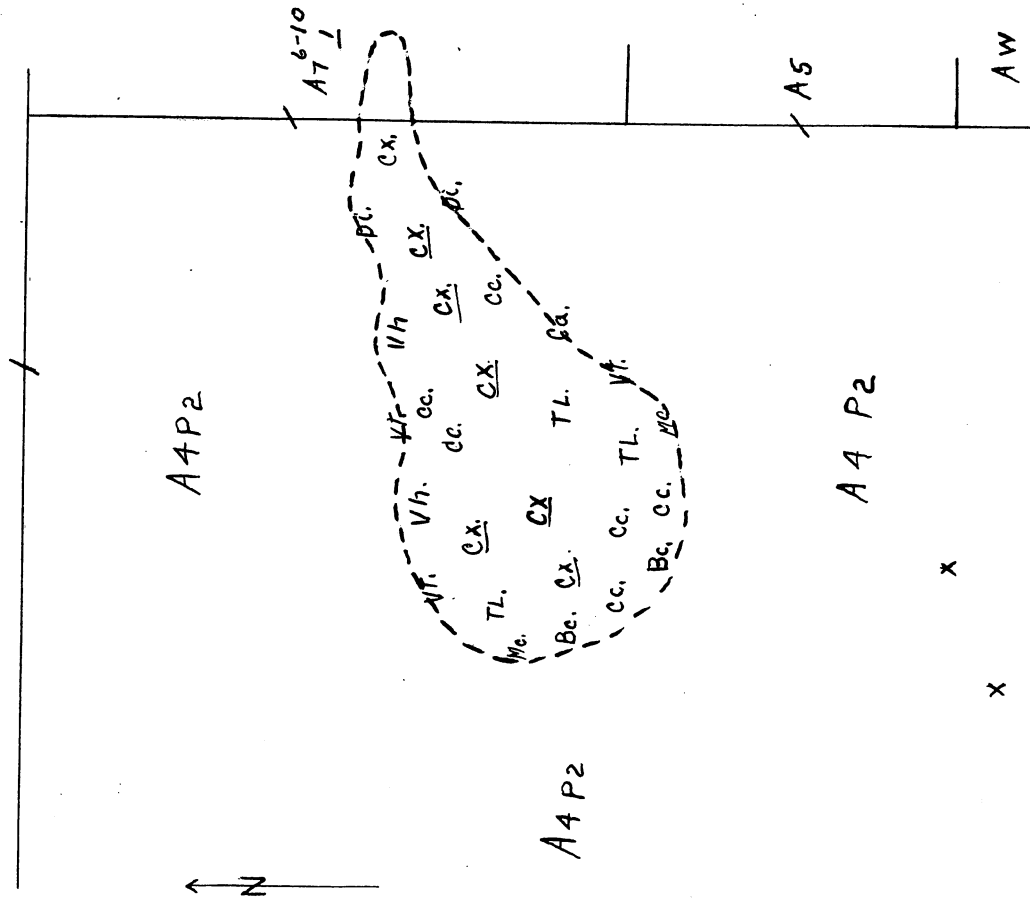
Cover: H. 15.64 D. 27.42 S. 16.50
 Concealment: Hor. 38.85% Verb. ---
 Surrounding Land: Des. Rolling AA pasture
 Food: Quant. 11.00 Qual. 22.00
 AV. 22.00 Dist. 21 Chains

Dist. to Suitable cover Nearest cover along river - 1/2 mile
 Grazing: Type and Intensity: Past About the same for
Past 6 years. Pres. Horses - 9, Sheep - 45, Cattle - 10 (Unit per 10.50 AC)
Effects on veg. Trampled & grazed - Upland sp. on edge
on game hab. Cover considerably reduced
 Weather con.: Marsh 6" - 28" B.H. - 24° Ice & Snow - Windy - cloudy
 Surrounding Area 1" - 22" B.H. - 20° Spots of snow - Windy - cloudy
 Imm. past gen. Windy & partly cloudy - Temp about 50°
 Wildlife: observed ---
 census ---

Feces ---
 Dens ---
 Tracks ---
 Other signs ---

Owners value ---
 Notes Drainage ditch running N. Apparently stopped
up. 6-7" of water in center of marsh. Frozen over.
291.66 acres in pasture.

Land hat posted - Hunted 1939 & 1940



Scale 1 inch = 7 chains

No. 18 Twp. Freedom S. 2 Loc. N.E. 1/4
Pic. No. Area: cons. x chs. 4.3 AC.
Type classes B5
Pres. Use Cattle Pasture
Past Hist. Ground Moraine

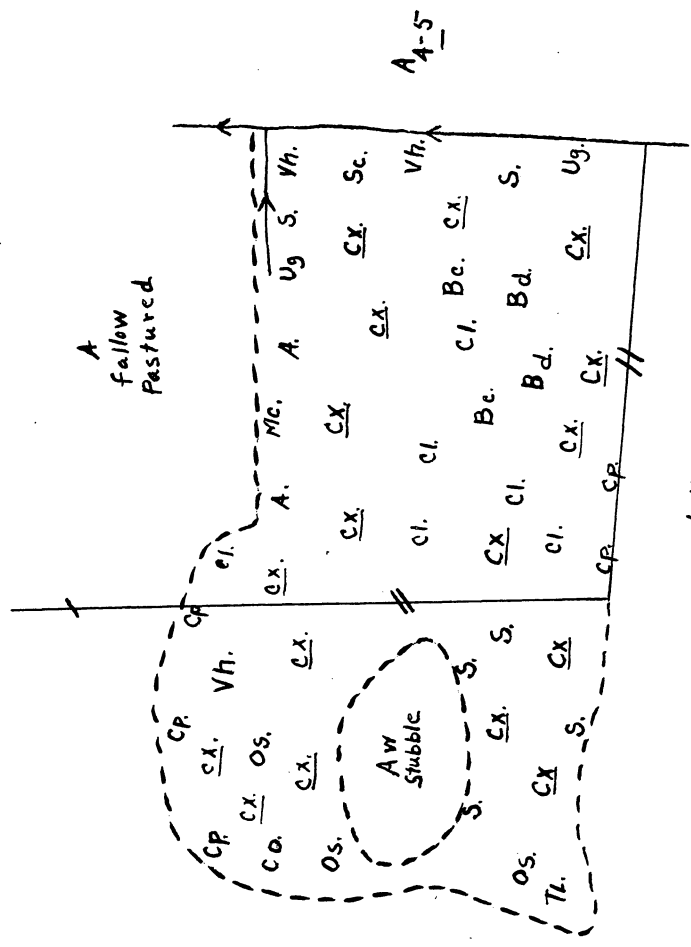
Open ditch put in along entire east side and for about 1/2 chains on N side some 20-30 years ago. Last clearing about 3 years ago. No burning - bother former size. Practically the same as at present. Use trend probably will remain in pasture although owner would like to plow and plant in corn.
Soil type Carlisle Muck pH 7.1
Vegetation: Dom. Carex lacustris Codom. Carex lanuginosa
ASSOC. SO. A, S, Bc, Bd, Vh, Os, Co, Mc, Th, Sc, Cp, Ug.

Food: Quant. M.A.R Qual. 22.00
AV. 15.34
Cover: H. 33.00 D. 31.52 S. 32.15
Concealment: Hor. 84.75 %
Surrounding Land: Des. Rolling Ag. 17, Pastured upland & Marsh.
Food: Quant. 27.36 Dist. 6-20 Chains
AV. 21.20
Dist. to Suitable cover 10 chains to NW.

Grazing: Type and Intensity: Past 12 cows-3 hrs
Pres. 12 cows-3 hrs (1 unit per 1.30 ac.)
Effects on veg. Slight evidence of grazing on game hab. No evident effects - Marsh in good condition
Weather con.: Marsh 6"-32? BH-30" 1" Snow gen. distributed AM.
Surrounding Area 6"-22? BH-20" 1" " h.w.
Imm. past gen. Clear & cold. Snow on ground - some melting
wildlife: observed song birds along edges.
census 3/12/41 - 9 pheasants with dog

Peccos Rabbit, Pheasant
Dens Bird nests in shrubs along edge
Tracks Rabbit, Mice, Dog, Skunk, Pheasant
Other signs

Owners value Thinks it fine corn land
Notes land posted - mares his cattle as seen as
Vegetation begins to show effects of grazing.
Hears that pheasants are using the area -
may hunt it himself next season.
Cattle net fenced 16th marsh. 15.6 acres in pasture.



A4-5
A7 6-10
A7 11

Scale 1/2 Inch = 1 Chain

No. 19 TWP. Freedom S. 2 LOC. NE 1/4
 PLO. NO. Area 1 Chs. X Chs. 7.5 AC.
 Type classes B6-7
 Past Use Pasture
 Past Dist. Ground Moraine

Pastured and burned by former owner but bare for past 3 years. No attempt to improve upon the good natural drainage. Former size apparently little or no change in size. Use trend probably will continue to be used as pastures but more or less irregularly.

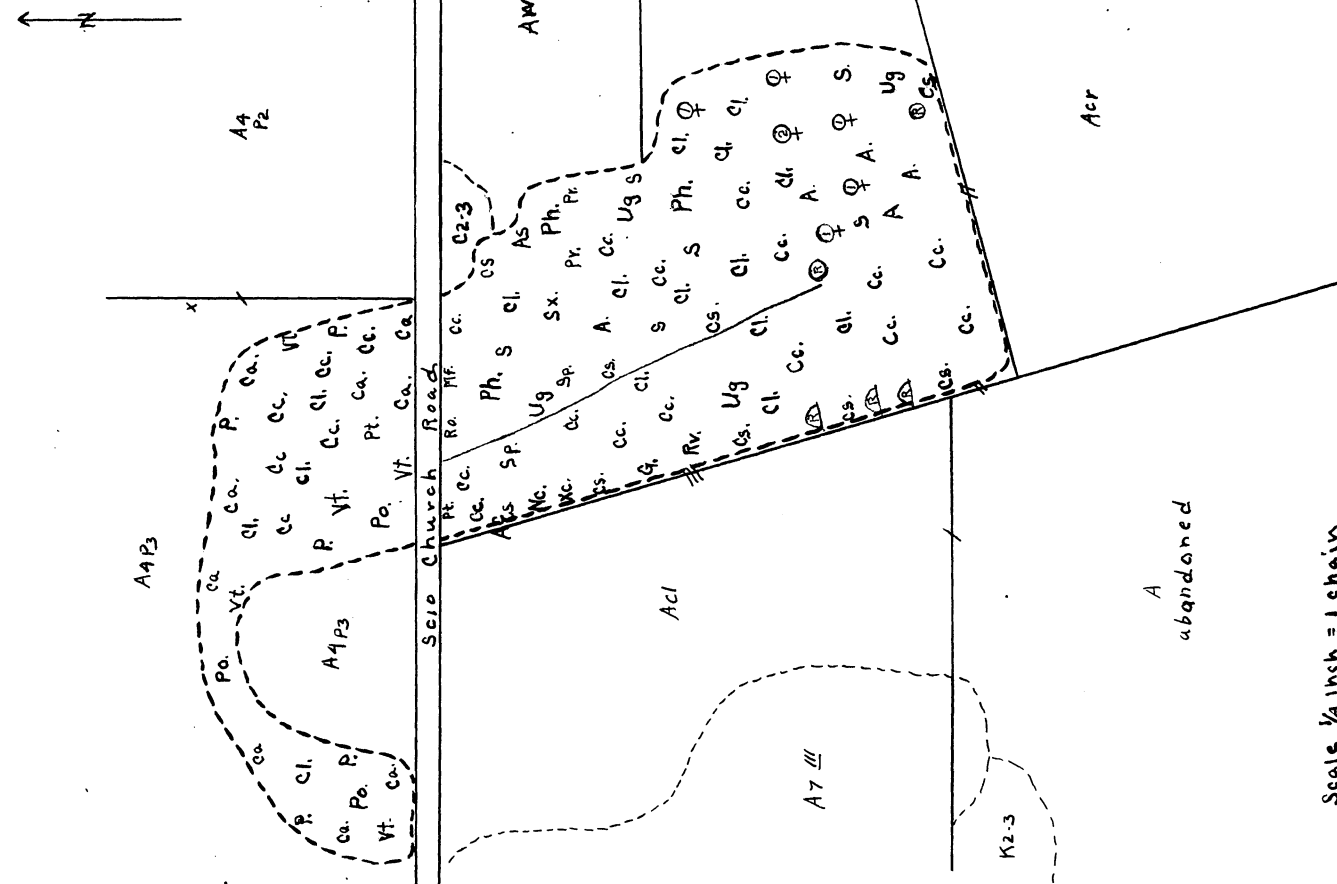
Soil type Carlisle Musk pH 7.1
 Vegetation: Dom. Salmogethis Canadensis Codium, Carex lanuginosa, Aspoc. so., S. Cs., Rv. Sp., Mf., C.A., Roy. Pr., Vt., Xc., Ug., Ph., Nc., Pt., A. P., G.

Food: Quant. 12.14 Qual. 22.00
 AV. 17.42
 Cover: H. 10.34 D. 28.65 S. 12.24
 Concealment: Hor. 54.35% Verb.

Surrounding Land: Des. Rolling Ag. Pasture, woodlot, abandoned
 Food: Quant. 26.36 Qual. 22.00
 AV. 19.20 Dist. 0 - 20 chains

Dist. to Suitable cover 10 chains
 Grazing: Type and Intensity: Past 8 cows-3 mo.
 (Unit per 60 Ac) Pes. None for past 3 years.
 Effects on veg. Trampling + mowing evident in N. E., heavy grazing not noted.
 on game hab. Cover + concealment values of N. E. considerably reduced.
 Weather con.: Marsh 6" 10% 38% B.H. 31% 34% light wind.
 Surrounding Area 6" - 36% 34% B.H. 29% 33%
 Imm. past gen. Clear to partly cloudy - temperatures mild.
 Wildlife: observed Pheasant #7, Rabbit #7, Sparrows, Cardinal, Titmouse
 census

Sees Pheasant (m), Rabbit (m)
Dens Rabbit(s), Birds nests (2)
Tracks Rabbit, Pheasant
 Other signs Pheasant hill (P) apparently by a bank. Small patch of
Rabbit fur.
 Owners value Good marsh pasture if needed.
 Notes Land pasted - hunt with permission. No water present on
The area at any time during this visit.
12 acres pastured



Scale 1/4 inch = 1 chain

Date Feb 26, 1991
 No. 20 Twp. Freedom S. Loc. SW 1/4
 Sec. 2 chs. 2, 0 Ac. 20
 File No. Area: chs. at
 Type classes B5 - 7
 Pres. Use None
 Past Hist. Ground Moraine - Acute type

Ne grazing or burning during past 20 years; probably none previous to this period.

Former size About the same as at present. Use trend Will continue to be idle as owner thinks it more valuable to wildlife.

Soil type Carlisle Muck pH 7.0
 Vegetation: Dom. Carex lasustris Codom. Bidens serena
 Assoc. so. Cs., Sp., R., Rl., Wv., Sp., Cs., APA., Sx., Iv., As., Pt., Sg.

Food: Quant. 18.38 Qual. 22.00
 AV. 28.18

Cover: H. 31.60 D. 33.00 S. 33.00
 Concealment: Hor. 98.29 % Vert. ---

Surrounding Land: Des. Flat to rolling Agricultural / Abandoned.
 Food: Quant. 28.26 Qual. 33.00
 AV. 31.28 Dist. 12 chains

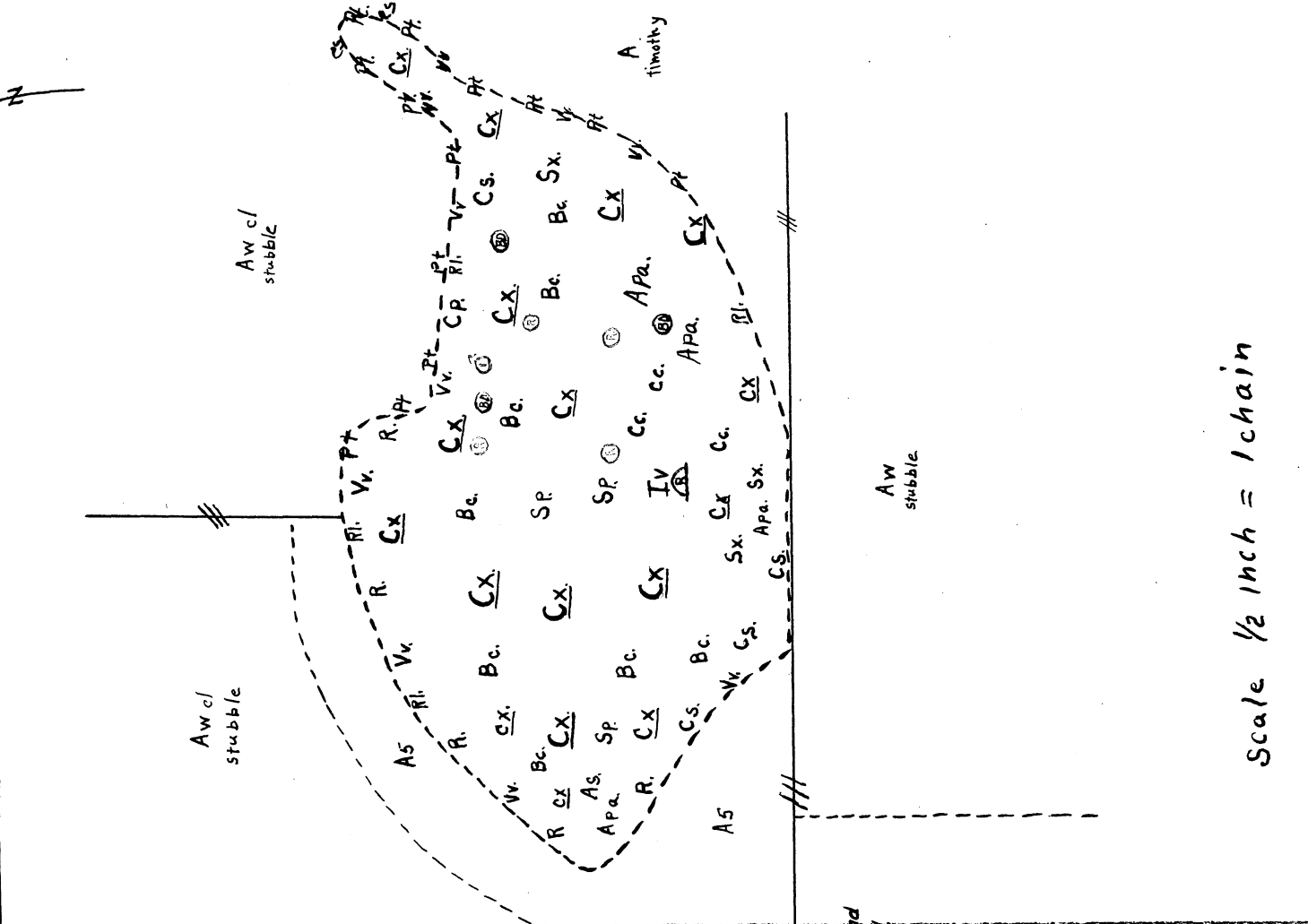
Dist. to suitable cover 2 ch. to SW, 10 ch. to E.
 Grazing: Type and Intensity: Past None
 Pres. None

Effects on veg. ---
 on game hab. ---

Weather con.: Marsh 6" - 40 2.38. BH - 29 2.38. 2" Show on ground L.W
 Surrounding Area 6" - 34 2.38. B.H. - 26 2.38. 2" " Light wind
 Imm. past gen. Clear or cold with light wind, snow on ground
 wildlife: observed Pheasant - 1, Rabbit - 5, Black duck - 2, Several
WHIPPET Marsh Hawk, say sparrow cardinal titmouse, yellow warbler
along edge. R.V. Blackbirds nesting

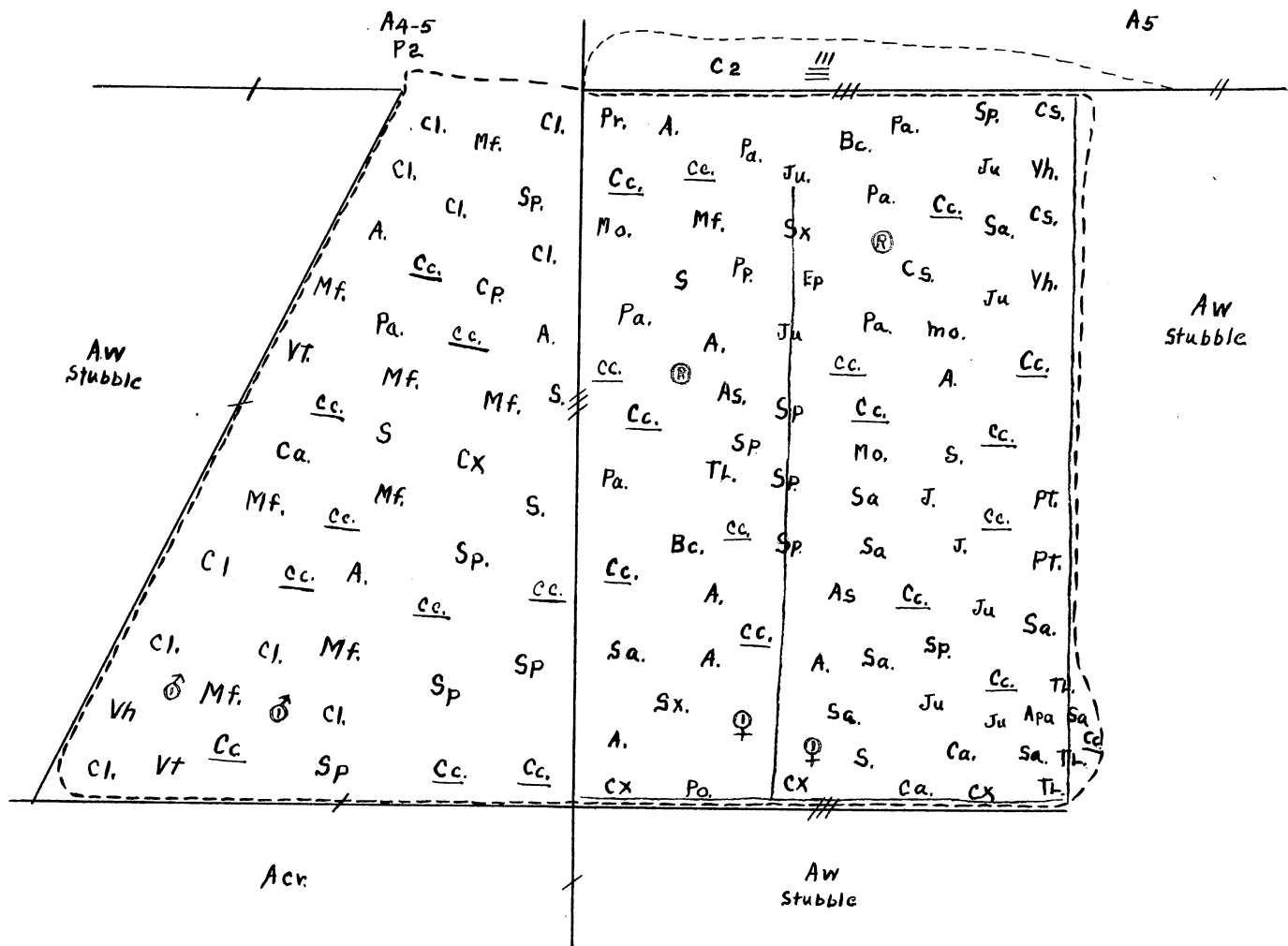
Feces Rabbit Pheasant (N)
 Dens Rabbit (O), Bird's Nest (S) Red-winged Blackbird, 3 Black duck
 Tracks Squirrel, Rabbit, Dog, Mice, Pheasant, possum (S)
 Other signs Heavy rabbit browsing on raspberry; Pheasant bill on
south edge

Owners value values it highly, but only because of the wildlife.
 Notes Land posted - ~~Wait~~ ~~Wait~~ Wait burn
because he don't want to run the birds out.
Mr. Shible has seen at least 20 birds in this
marsh this winter. ^{Feb 15} A good natural drainage, no ditch.
Positively he hunting for several years.



Scale 1/2 inch = 1 chain

No. 21 Twp. Freedom S. Date Feb. 26, 1941
 Sec. No. 2 Loc. SW 1/4
 Area: 9.5 chs. x 8 chs. 7.48 Ac.
 Type cleared BZ
 Pres. Use Pasture
 Past Hist. Ground Moraine - High Water Table type
Shallow drainage ditches put in about 20 years
ago, little if any cleaning of ditches.
 Former size Practically no change.
 Use trend Probably to remain in pasture - owner afraid of
forest if planted to corn.
 Soil type Cartisle Musk pH 7.0
 Vegetation: Dom. Calamagrostis Canadensis Codom. None
 ASSOC. SO. Cl., Ill., Sa., Ju., J., Apa., Ca., As., VT., A., S., May
Pay., Vh., E.P., Bc., Cs., Sp., Sx., Po., Pe., Pr., Mf.
 Food: Quant. 12.62 Qual. 22.00
 Av. 14.49
 Cover: H. 13.53 D. 29.19 S. 14.68
 Concealment: Hor. 49.90 Verb. ---
 Surrounding Land: Des. Flat to rolling Ag. and Pasture.
 Food: Quant. 28.26 Qual. 33.00
 Av. 31.26 Dist. 1-12 chains
 Diet. to Suitable cover 1 chain
 Grazing: Type and Intensity: Past same for past 5 years
Pres. 6 cows. (1 cow per 3.23 acs)
 Effects on veg. Grazed and trampled, particularly in west part
on game hab.
 Weather con.: Marsh 6°-38°, 39° BH-32°, 32° Light Wind
Surrounding Area 6°-34°, 34° BH-30°, 20° "
Imm. past gen. Partly cloudy with light winds.
 Wildlife: observed Pheasant ad + 2♀, Rabbit 2
census
 Feeces Pheasant, Rabbit, dog
 Dens ---
 Tracks Pheasant, Rabbit
 Other signs ---
 Others value ---
 Notes Land posted - hunt with permission. Don't bother
to burn.
19.4 acres in pasture.



Date Feb. 26, 1941

No. 22 Twp. Freedom, Lima S. 4 T. 33 Loc. NE 1/4 T 33 E 1/4

Sec. No. Area: chs. x chs. 56.15 AC.

Type classes B5-6

Pres. Use Sheep and Cattle Pasture + rmp

Past Hist. Ground Moraine

Burbed at 3-4 year intervals; last burning April 1938

Old open ditch across south portion cleared out 4 years ago.

Former size Pasture

Use trend Will undoubtedly be pastured as long as the present owner keeps it.

Soil type Carlisle Muck pH 7.0

Vegetation: Dom. Carex lanuginosa Codom. Celastrus canadensis

ASSOC. SO. Ca, Vh, Ct, Co, ME, CX, Vt, Tl, S, E, Sa, Vh, To,

As, P

Food: Quant. 10.41 Qual. 11.00

AV. 14.25

Cover: H. 14.74 D. 29.91 S. 16.38

Concealment: Hor. 46.40 26 Vert.

Surrounding Land: Des. Rolling Pasture, Ag, 4 woodlots

Food: Quant. 22.00 Qual. 33.00 (conv)

AV. 33.00 Dist. Adj. to 5-10 chains

Dist. to Suitable cover Adj. swamp, otherwise 20 ch SE.

Grazing: Type and Intensity: Past Approx. the same for Past 8 years.

Pres. 75 Sheep & 14 Cattle (Unit per 4.55 Ac.)

Affects on veg. closely grazed over the majority of the area.

on Game hab. Game conditions generally poor except in N. part.

Weather con.: Marsh 6"-30" BH. - 24° Cloudy - light wind

Surrounding Area 6"-22" BH. - 20°

Imm. past gen. light snow - cloudy and below freezing.

Wildlife: observed 6 Quail (one edge) Red-wing, Blackbirds

census

Feces Pheasant, Rabbit

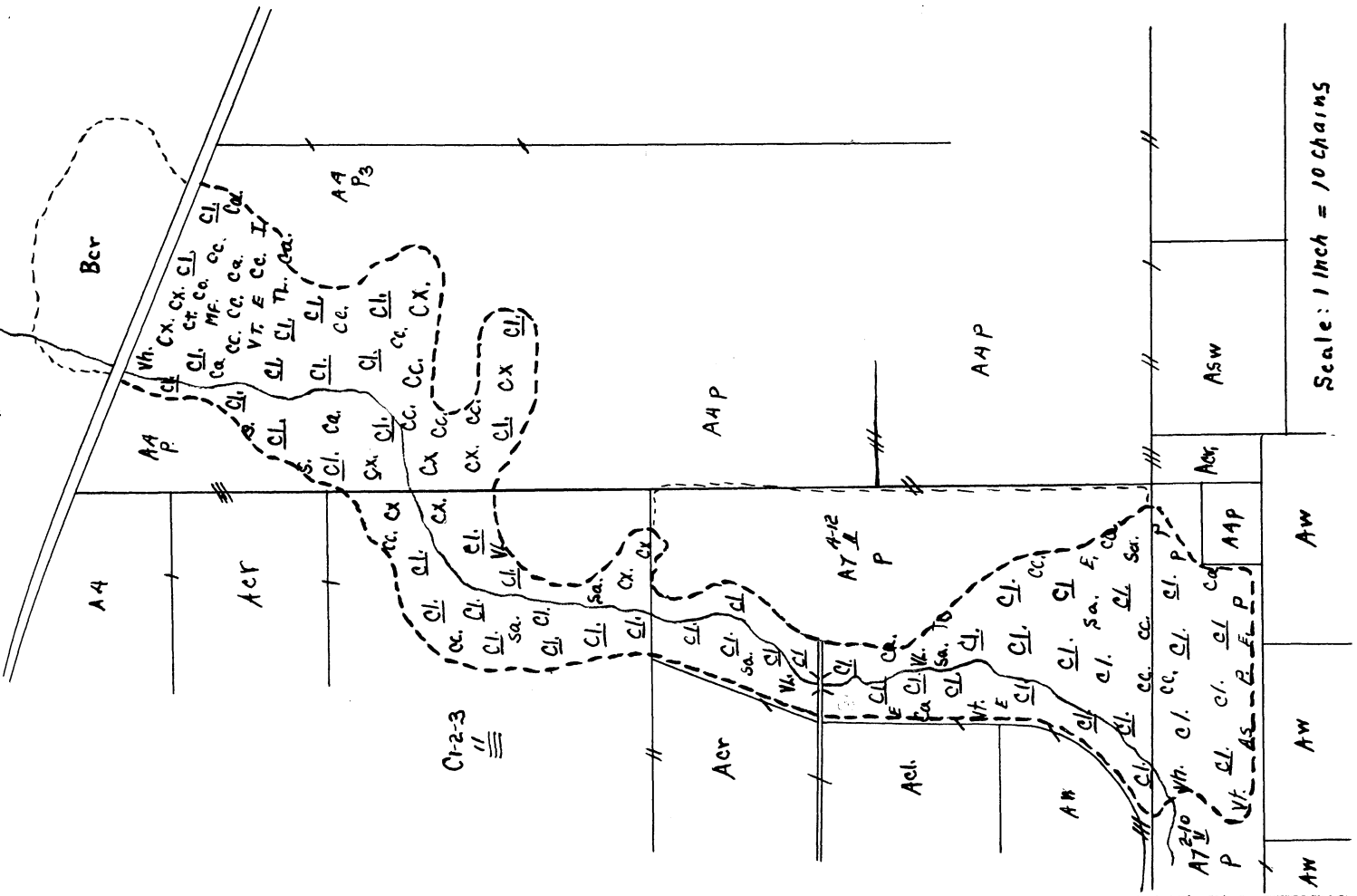
Dens Red-wing, Blackbirds, hedges.

Tracks Pheasant, Rabbit

Other signs

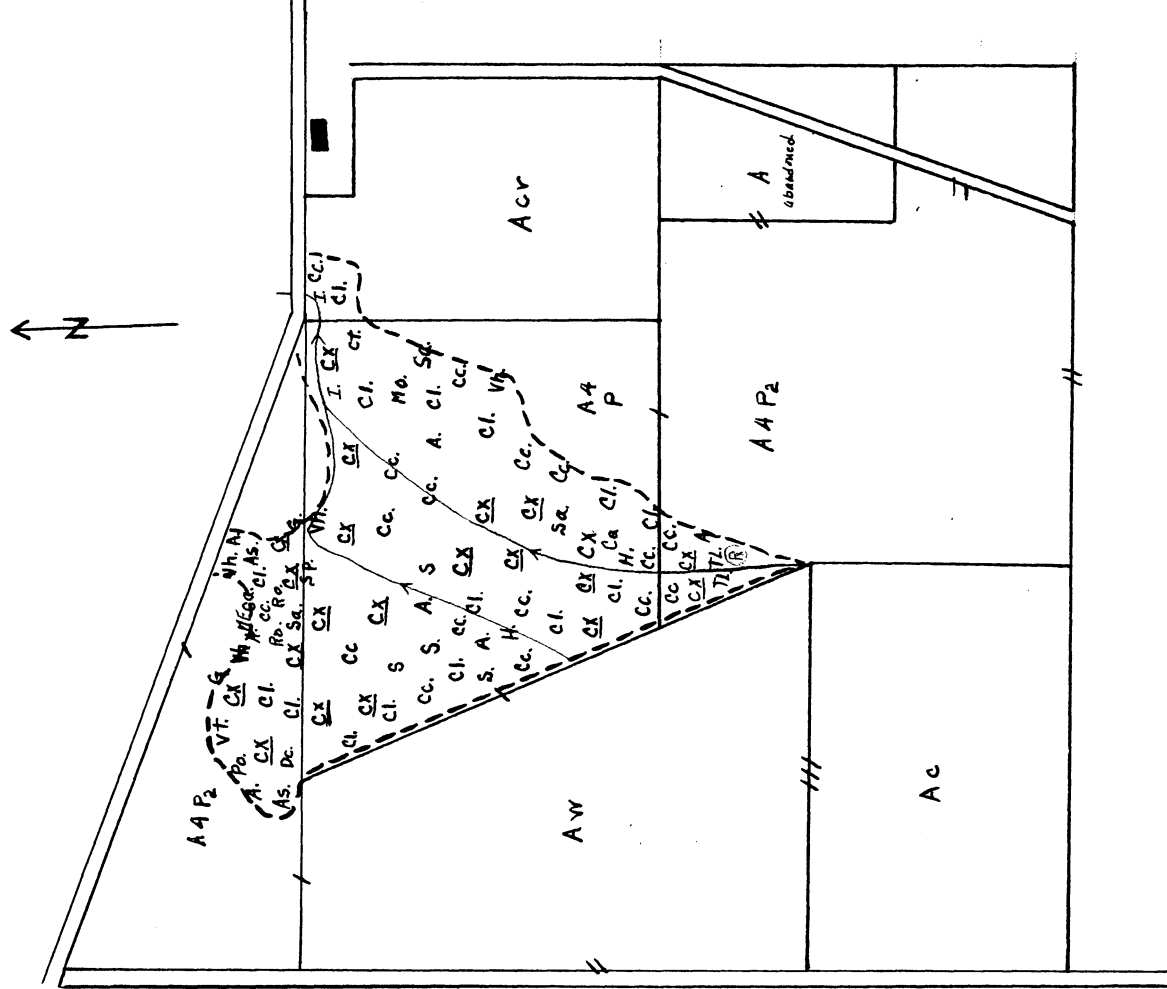
Owners value Essential to his present farming methods.

Notes Pested land - permits practically anyone to hunt on the area. Open ditch drainage serves the southern part and connects with the natural channel. Uses marsh to hold livestock until timely closer, et alfalfa fields are ready to be pastured. 132.1 AC. in pasture crop yields good.



Scale: 1 inch = 10 chains

Date Feb 26, 1991
 No. 23 Twp. Eresdora S. 2 Loc. NW 1/4
 Sec. No. 14 Area: chs. x chs. 14.8 Ac.
 Type classes B6
 Pres. Use Pasture
 Post Hist. Ground Moraine. - Extinct lake type
Open ditch drainage put in many years ago. Majority of it stepped up before had much effect but outlet to N.E. still carries off much water.
 Former size _____
 Use trend To remain in pasture because of difficulty of drainage on this particular area.
 Soil type Mauvee loam pH 6.5
 Vegetation: Dom. Carex lacustris Codom. Salicagrostis canadensis
 Assoc. So. Ro. As, Ca, Yh, Ju, Sa, Cl, I, Ct, Vt, A, Pog, De, S.
 Hy. Th. Mc
 Food: Quant. 8.28 Qual. 11.00
 AV. 6.54
 Cover: H. 14.36 D. 31.96 S. 13.96
 Concealment: Hor. 66.75 70 Vert. _____
 Surrounding Land: Des. Rolling pastures, Ag. and woodlot.
 Food: Quant. 22.31 Qual. 22.00
 AV. 25.24 Dist. 3-15 chains.
 Dist. to Suitable cover 3.5 chains
 Grazing: Type and Intensity: Past same for past 3 years
 Pres. 14 cattle - 3 moe. (unit per 1.05 Ac.)
 Effects on veg. Considerable trampling in dryer parts. Some grazing on game hab. Reduced cover due to grazing and trampling.
 Weather con.: Marsh 6"-39"-39" B.H. 34°-36° Clear to partly cloudy
 Surrounding Area 6"-36°-35" B.H. 33°-34° " " "
 Imm. past gen. Partly cloudy with mild temperatures.
 Wildlife: observed Rabbit (2), Microtus (3).
Notes May 1991 - Mollard drake, R-W Blackbird - Marsh Hawk.
 Feces Pheasant (V.N.) Rabbit, weasel, Min A (May 7, 1991)
 Dens Birdnest, Microtus (M) May 7 - New trackout house just built
 Tracks Pheasant
 Other signs Pheasant kill (8) in N. part
 Owners value _____
 Notes Extern abandoned - Grazing by Mr. Shible. Land posted but permits hunting. Drainage poor - much ice & water on area. Don't burn because area generally to wet at the time that burning should be done.



Scale: 1 inch = 10 chains

No. 24 TWP. Sharon S. 3 Loc. SW 1/4
 Date March 26, 1941
 Area: chs. x chs. 1.2 Ac.
 Type classes B5
 Pres. Use None
 Past Hist. Ground moraine

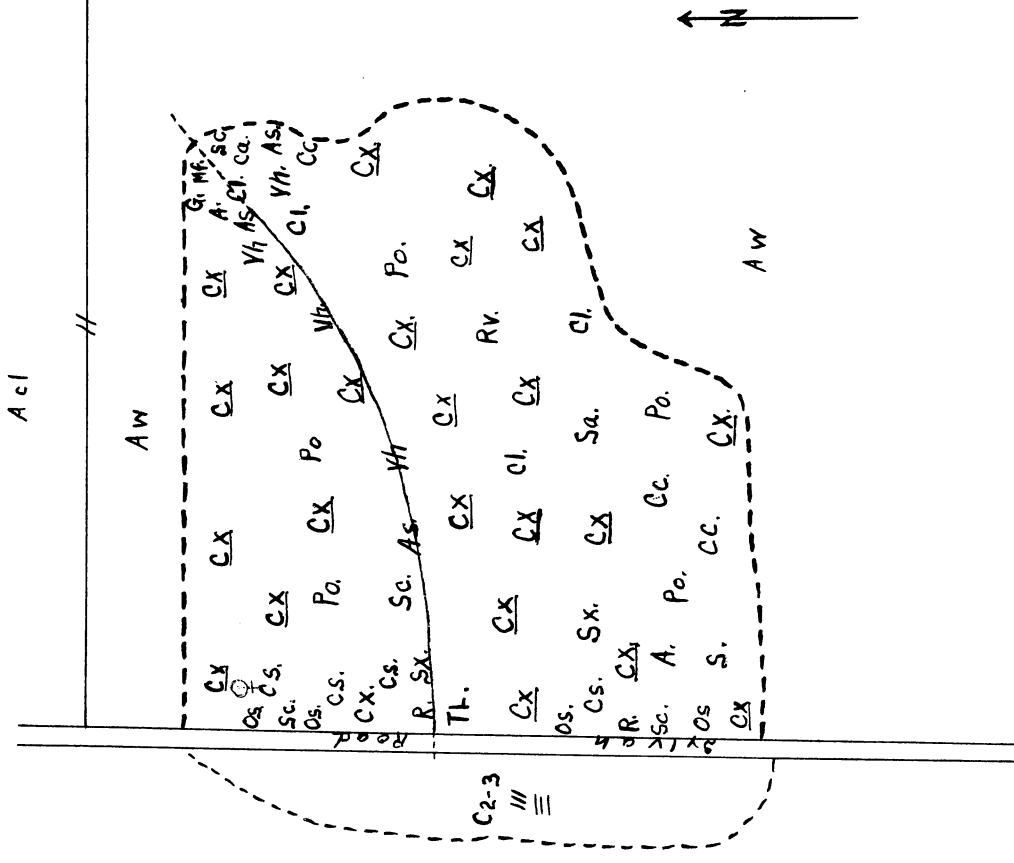
Open ditch put in at least 50 yrs. ago. About 50 ft. of 6" tile put in in NE corner some 20 yrs. Moved 6 years ago. Sheep on area 3 years ago (1938). Burned April 1940. Small amount hay cut fall 1940. Former size. Extended 15' each to west. Area now in swamp. Use trend to be pastured. When surrounding area in cover.

Crop 1 year rotation.
 Soil type Carlisle Muck pH 7.0
 Vegetation: Dom. Carex lasustris Codom. hens
 Assoc. so. Cl., Cs., Sc., Mf., G., A, AS, Ca, Vh., Po., Os., Cs., R., S., Th., Rv., Sa., S.

Food: Quant. 8.40 Qual. 0
Cover: H. 23.46 D. 33.00 S. 28.84
Concealment: Nor. 86.54 % Vert.
Surrounding Land: Des., Rolling Ag., Pasture, and woodlots
Food: Quant. 11.00 Qual. 22.00
Av. 22.00 Dist. 10 chains
Dist. to Suitable cover 8 chains
Grazing: Type and Intensity: Past (1940) 100 sheep/week

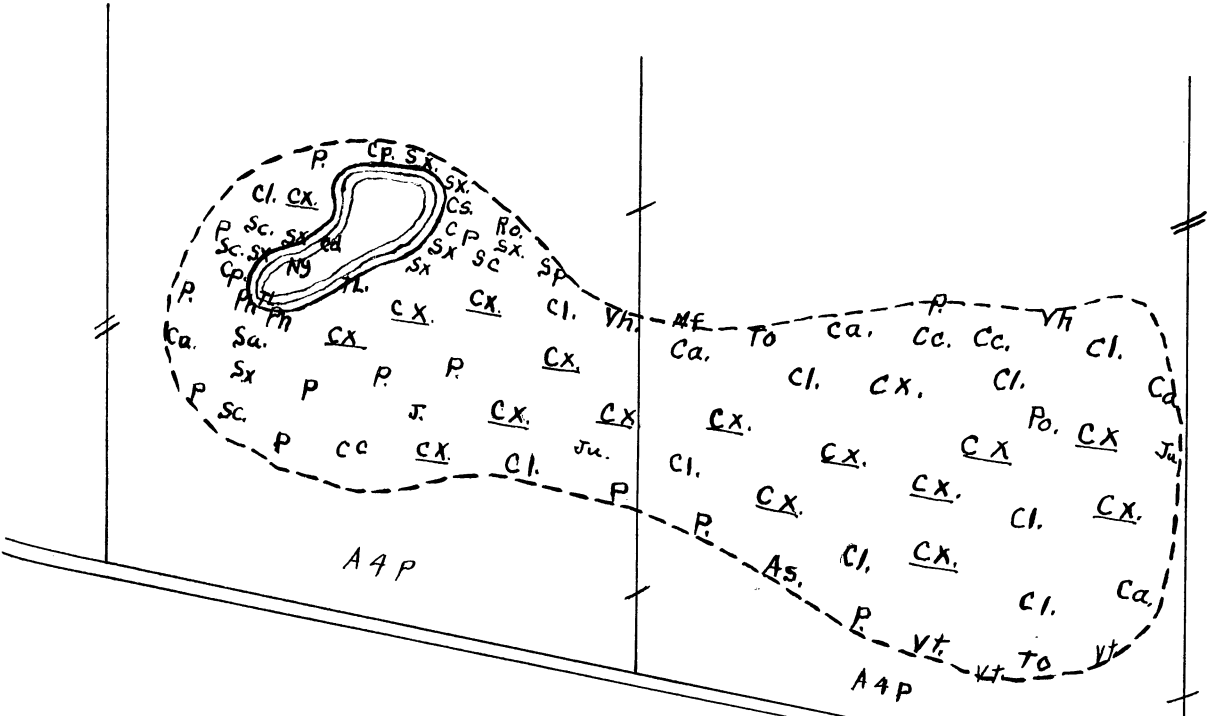
Effects on veg. No apparent effect. Cut at a "where mowed on game hab. No apparent effect. Cover greatly reduced where mowed
Weather con.: March 6' - 51° 50' BH - 48° 44' Clear - light wind.
Surrounding Area 6' - 48° 47' BH - 47° 42' "
Imm. past gen. Clear to partly cloudy - Temp build.
Wildlife: observed Pheasant 1 ♀.
census

Feces Pheasant, Rabbit.
Dens
Tracks
Other signs small patch of rabbit fur
Owners value Practically none
Notes land pested - permits hunting - hunted 1940-41 season - Don't know whether any birds were killed. Drainage satisfactory to Mr. Schriber but is on a large part of the area. 8 loads of hay taken 6 years ago. Sprinkled with molasses for sows. Burns to increase vegetation in case he wants it. 1940 cut for covering hay stacks.



Scale 1/2 inch = 10 chains

No. 25 Twp. Lima S. 31 Loc. SF 1/4
 Sec. No. Area Chs. X Chs. 48.00 Ac.
 Type classes B5
 Pres. Use Pasture and Marsh Hay
 Past Hist. Ground Moraine. - Lake basin type
Has remained in approximately the same condition for past
30 years. - Slight decrease in size of lake. Hay cut from
west 1/2 in fall of 1990. Cuttings made annually.
Former size Marsh gradually taking over basin as lake dries up.
Use trend to remain in pasture with occasional
cuttings of marsh Hay
 Soil type Carlisle Muck pH 7.0
 Vegetation: Dom. Carex lacustris Codom. Carex languinea
 Assoc. So. Sa. II, Ph. J, Ju. P, Cc, Cp, Cs, Ro, Sx, Ss, Cay
 Vh. As, Ia, VI, M, N, Cd
 Wood: Quant. 13.79 Qual. RR.00
 Av. 16.98
 Cover: H. 14.46 D. 31.94 S. 20.26
 Concealment: Hor. 40.34% Vert.
 Surrounding Land: Des. Rolling pasture upland, weedy marsh
 Food: Quant. 11.00 Qual. 22.00
 Av. 22.00 Dist. 14 chains
 Dist. to Suitable cover A chains from SE corner
 Grazing: Type and Intensity: Past same for about last
10 years. Pres. 16 cows, 55 sheep, horse. - (1 unit per 4.53)
Effects on veg. Avg. ht. 5" where mowed - Considerable grazing on the rest,
on game hab. Generally poor cover with a little food in NW part.
 Weather con.: Marsh 6" 42°, 40° BH 39°, 36° clear-light wind
 Surrounding Area 6" 38°, 34° BH 37°, 32° " "
 Imm. past gen. clear with light wind - Temp mild
 Wildlife: observed Pheasant 1♂, Scaup 2, Ring-necked P., Mollard,
census
 Feces Pheasant, Rabbit
 Dens
 Tracks
 Other signs
 Owners value Fairly good pasture - would prefer upland
Notes land pasted, permits hunting. No artificial
drainage. Doss hat bother to burn. Hay cut 1/2
Tex. pet acre. Birds killed in this area last year but owner
don't know how many. Pasture marsh from about May 15 -
Sept. 12.7 acres in pasture.

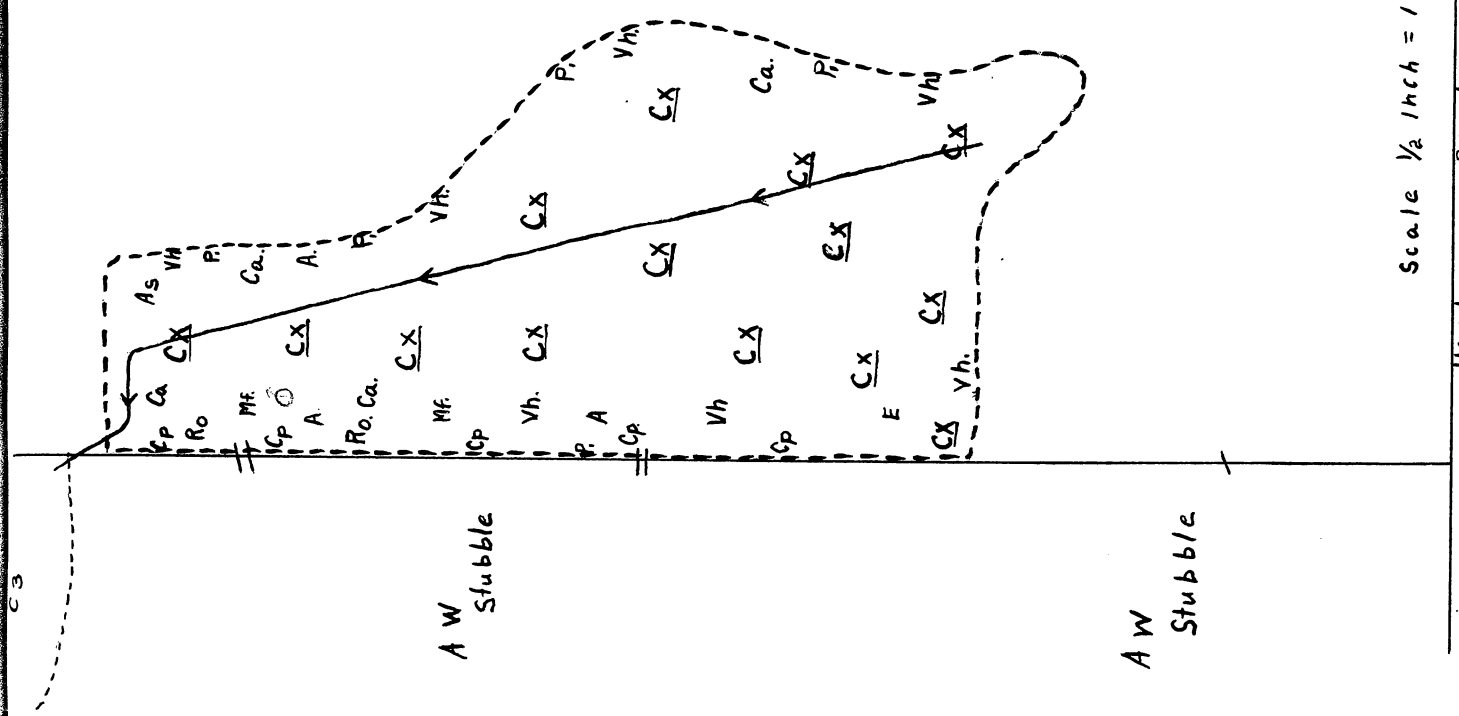


Scale: 1/2 Inch = 4 chains

No. 27 Twp. Freedom S. 11 Loc. SW 1/4 AC.
 Date March 17, 1941
 Plo. No. Area: chs. x chs. 2.8 AC.
 Type classes B5
 Pres. Use Pasture
 Past Hist. Ground Moraine
Open ditch drainage put in some years ago before present lessee took over. Apparently never proved satisfactory. No attempt to improve it.
 Former size
 Use trend Probably to remain in its present condition and continue to comprise part of a pastured area.
 Soil type Carlisle Muck pH 7.1
 Vegetation; Dom. Carex lacustris Codom.
 ASSOC. SO. CP, Ca., As., Vh., Ro, Mh., A., E., P.

Food: Quant. 10.42 Qual. 22.00
 AV. 16.35
 Cover: H. 18.59 D. 26.21 S. 21.57
 Concealment: Hor. 76.25% Vert:
 Surrounding Land: Des. Relling Pasture and woodlots
 Food: Quant. 11.00 Qual. 22.00
 AV. 22.00 Dist.
 Grazing: Type and Intensity: Past Sams for past 3 years
Previous pasture unknown Pres. 45 Sheep - 3 mo. (Unit per 2 Ac.)
Effects on veg. Practically no evidence of use by sheep on game hab. Small patch matted down in west end.
 Weather con.: March 6 = 17° B.H. = 10° 1" show - High wind
 Surrounding Area 6" = 10° B.H. = 8° Drifting snow - High wind
 Imm. past gen. Small amount of sheep shorn by Gale, Temp well below 20°
 Wildlife: observed ♂ pheasant (1)
 census

Food Pheasant
 Dens None
 Tracks Pheasant, mice
 Other signs
 Owners value Practically none - not used by sheep
 Notes land not posted, drainage not particularly satisfactory, hunted 1940 - 2 birds taken
Once burned by present lessee but proved to west to be of much use 18 acres in pasture



A 9 P2

AA P2

Scale 1/2 inch = 1 chain

Road

Date MARCH 12, 1990

Site 8 Loc. NW 1/4

Area: chs. x chs. 8.00 Ac.

Type classes B8-6

Pres. Use Pasture

Post Dist. Terminal moraine - Lake Basin type

No attempts to drain - pastured for 10-12 years butted last in 1938.

Former size Marsh occupying old lake basin as lake dries up

Use trend pasture only previous use - will probably continue in this use.

Soil type Rifle Peat pH 6.8

Vegetation: Dom. Carex - lacustris Codom. Sambucus canadensis

Assoc. so. CC, Vh, Cl, ME, H, As, Ca, Vt, Ph

Key Sp. A, E, H, E

Food: Quant. 10.40 Qual. 22.00

AV. 16.36

Cover: H. 11.20 D. 21.35 S. 19.69

Concealment: Hor. 55.65 Vert. 20

Surrounding Land: Des. Rolling Pasture

Food: Quant. 11.00 Qual. 22.00

AV. 22.00 Dist. 10-12 chains

Dist. to suitable cover 8 chains

Grazing: Type and Intensity: Past same past 4 years

Pres. 56 sheep (1 unit per 1.70 ac)

Effects on veg. Slight amount of grazing

on game hab. Cover matted down in several spots - reduced

Weather con.: Marsh 6" - 28° BH 24° cloudy - winds

Surrounding Area. 6" - 20° BH 19° " "

Imm. past gen. cloudy + cold - winds

Wildlife: observed Pheasant 29 Rabbit 2

census

Feces Pheasant, Rabbit, Misc

Dens

Tracks Pheasant, Rabbit

Other signs

Owners value Needs it for pasture - would prefer upland

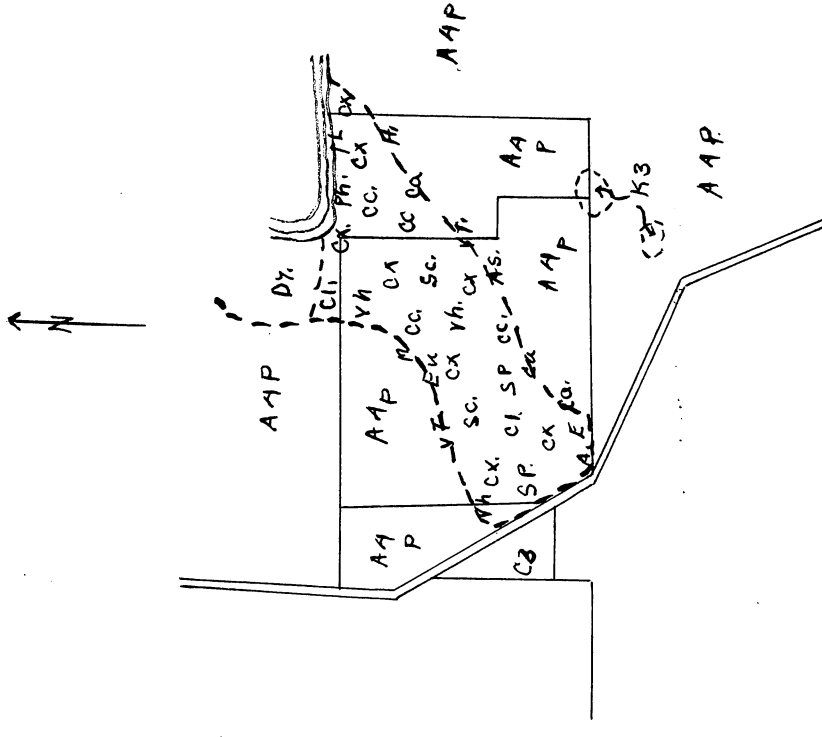
Notes land pasted - no hunting permitted

Sheep usually on area during hunting

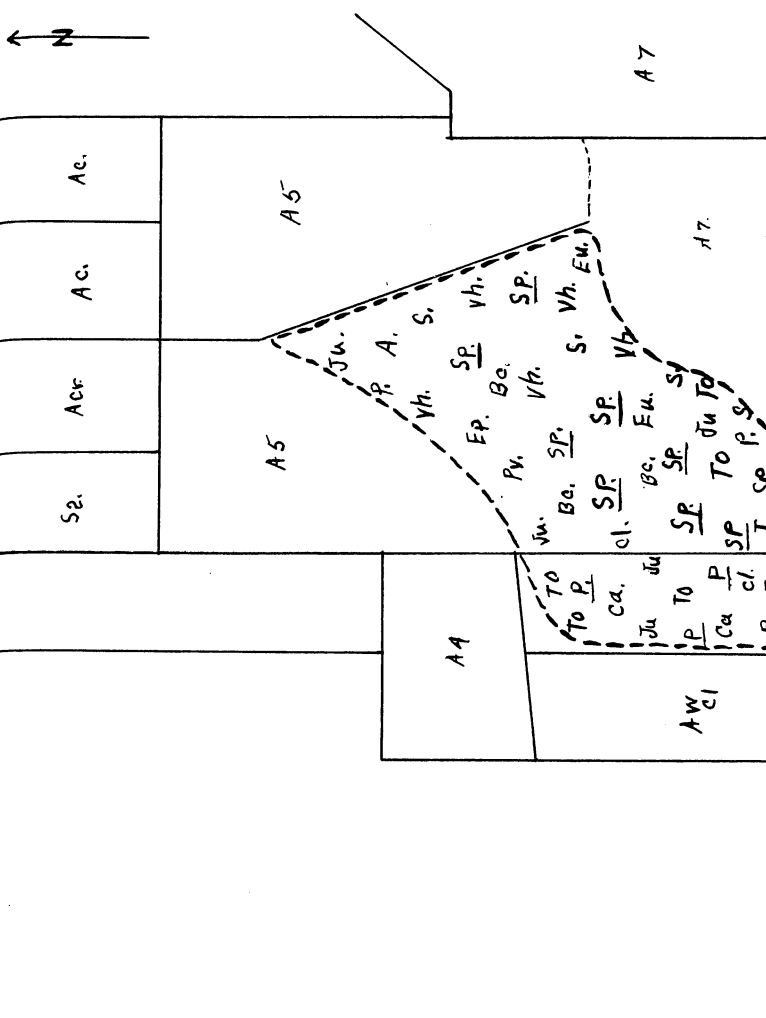
Season Burns occasionally to remove old

vegetation and allow sheep to get young growth

10.7 acres in pasture.



Scale: 1 inch = 16.5 chains.



Section I

Section II

Scale 1 Inch = 9 Chains

Section I
 No. 29 Twp. Lodi Date March 17, 1941
 P.L.C. No. 6 Area: chs. x chs. 8.7 Ac.
 Type classes BA
 Pres. Use None
 Past Hist. Terminal Meraine - Lake Basin type
Natural drainage only - No pasturing for
past 6-8 years - No burning
 Former size Practically the same as at present.
 Use trend Will probably be pastured this
year or next.
 Soil type Carlisle Muck PH 7.0
 Vegetation: Dom. Spiraea alba Codom. None
 Assoc. so. Il., I., Cx., To., Ju., S., Cl., Vh., Em., P., A., Py., E., B.,
 Food: Quant. 15.43 Qual. 22.00
 Av. 17.46
 Cover: H. 31.41 D. 30.13 S. 28.43
 Concealment: Hor. 88.64% Vert. 0
 Surrounding Land: Des. Practically flat Agr. pastures, & woodl.
 Food: Quant. 22.00 Qual. 22.00
 Av. 22.00 Dist. 10-16 chains
 Dist. to Suitable cover 23 chains.
 Grazing: Type and Intensity: Past 6 cows
 Pres. None
 Effects on veg. Practically no remaining evidence
 on game hab. "
 Weather con.: Marsh 6"-34" BH. 29° Clear & windy
 Surrounding Area 6"-27° BH. 26° " "
 last past gen. Clear and windy - Temp. about freezing
 Wildlife: observed Pheasant 32.10, Rabbit 2
 census
 Feces Rabbit, Pheasant.
 Dens
 Tracks Rabbit, Pheasant, Fox squirrel (E. edge)
 Other signs
 Owners value Prefers upland pasture.
 Notes Net pasted - Hunted 1940 Season -
at least 1 pheasant & several rabbits
killed.

Section II

Date March 17, 1991

No. 29 Twp. 60d1 S. 179.20 Loc. West 1/2 S

Plo. No. 6 Area: --- chs. x --- chs. 10.1 Ac.

Type classes B5-6

Pres. Use Pasture

Past Hist. Terminal Marake - Lake Basin Type

Natural drainage daly - pastured for

the last 15-20 years. No burning.

Former size Practically the same as at present

Use trend To remain in pasture under present

Plans of the border

Soil type Carlisle Much PH 7.0

Vegetation: Dom. Pop. sp Codom. Carex lanuginosa

Assoc. so. Id., Ca., Ind., Ky., Va., As.

Food: Quant. 8.15 Qual. 11.00

AV. 11.86

Cover: E. 14.27 D. 29.96 S. 15.36

Concealment: Hor. 30.50 Vert. ---

Surrounding Land: Des. Practically flat Ag., pasture, woodlot.

Food: Quant. 22.00 Qual. 22.00

AV. 22.00 Dist. 10-16 chains

Dist. to Suitable cover Section I edge or E. 3 chains

Crazing: Type and Intensity: Past 8-12 cows.

(1 cow per 1.2-1.77 ac.)

Effects on veg. Closely grazed with grass taking over. The area

on game hab. Very little cover available within Section II

Weather con.: Marsh 6"-32° B.H. - 28° Clear & windy

Surrounding Area 6"-27° B.H. - 26° "

Imm. past gen. Clear & windy - Temp. about freezing

Wildlife: observed Pheasant 12

census

Feces Pheasant, Rabbit

Dens

Tracks Pheasant, Rabbit

Other signs

Owners value Makes fairly good pasture in present condition

Notes Not posted - probably little attention

given this section during the hunting season

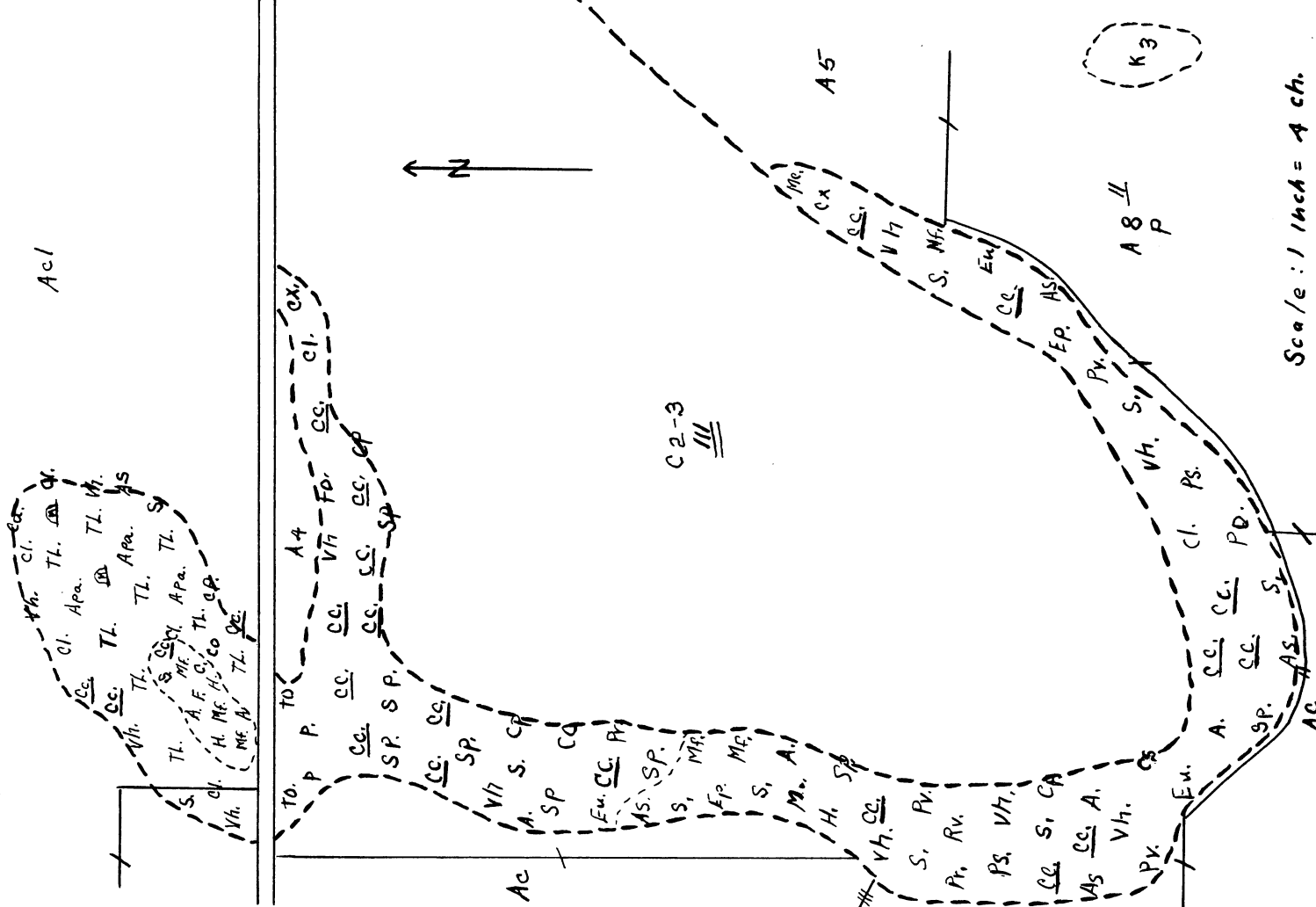
Due to the presence of food cover on Section I

19.2 acres in pasture.

See Map For No. 29 Section I

Date March 20, 1941
 Title 30 Imp. Freedom S. 12 + 13 100. SE 1/4 + NE 1/4
 Plot No. 7 Area: chs. x chs. 14.0 AC.
 Type classes B5-8-7
 Pres. Use None
 Past Use None
Ground Maraine -
Area gradually decreasing as a result of the increase
of the Swamp. No use of any type
 Former size Approx 50 Ac. - Majority now in Swamp.
 Use trend Continued Idleness

Soil type Cay. Lisle Musk pH 7.0
 Vegetation: Dom. Calamagrostis Canadensis Codom. None
 Assoc. so. TL, ME, APA, A, H, C, Vh, S, CP, Cay, Cs, Co,
To, P, SP, Ch, Eu, EE, Rk, Pk, Ps,
 Food: Quant. 12.60 Qual. 22.00
 Av. 19.24
 Cover: P. 32.53 D. 31.20 S. 23.64
 Concealment: Hor. 89.49 70 Vert.
 Surrounding Land: Des. Rolling Agricultural and Swamp.
 Food: Quant. 22.00 Qual. 33.00
 Av. 32.00 Dist. Adj. - 14 chains
 Dist. to Suitable cover Adjacent Swamp Type
 Grazing: Type and Intensity: Past None
 Pres. None
 Effects on veg. ---
 on game hab. ---
 Weather con.: Marsh 6" - 40° 39° BH. - 37° - 35° Cloudy
Surrounding Area 6" - 36° 34° BH. - 35° - 32° Cloudy
Imm. past gen. Cloudy with light wind, Temp below freezing.
 Wildlife: observed Red-wing Blackbird
census 10 ♀ pheasants
 Feces Rabbit, Pheasant, Dog
 Dens 2 Muskrat houses in use
 Tracks Pheasant, Mice, Sedge
 Other signs 18 pheasant kill.
 Owners value Practically none in present condition.
 Notes Land pasted but hunting undoubtedly takes
place as owner works in Ann Arbor. No burning
or artificial drainage. Water frozen on the
majority of the area.



Scale: 1 inch = 4 ch.

No. 31 Twp. Freedom S. 2 Loc. NE 1/4
 Plat. No. 10 Area: chs. x chs. 17.2 Ac.
 Type classes B6
 Pres. Use Pasture
 Past Hist. Ground Moraine
Open ditch drainage put in 20-30 years ago. Cleared
and improved about 1938.

Former size about as at present but mineral soil encroaching at edges
 Use trend Apparently to remain as pasture

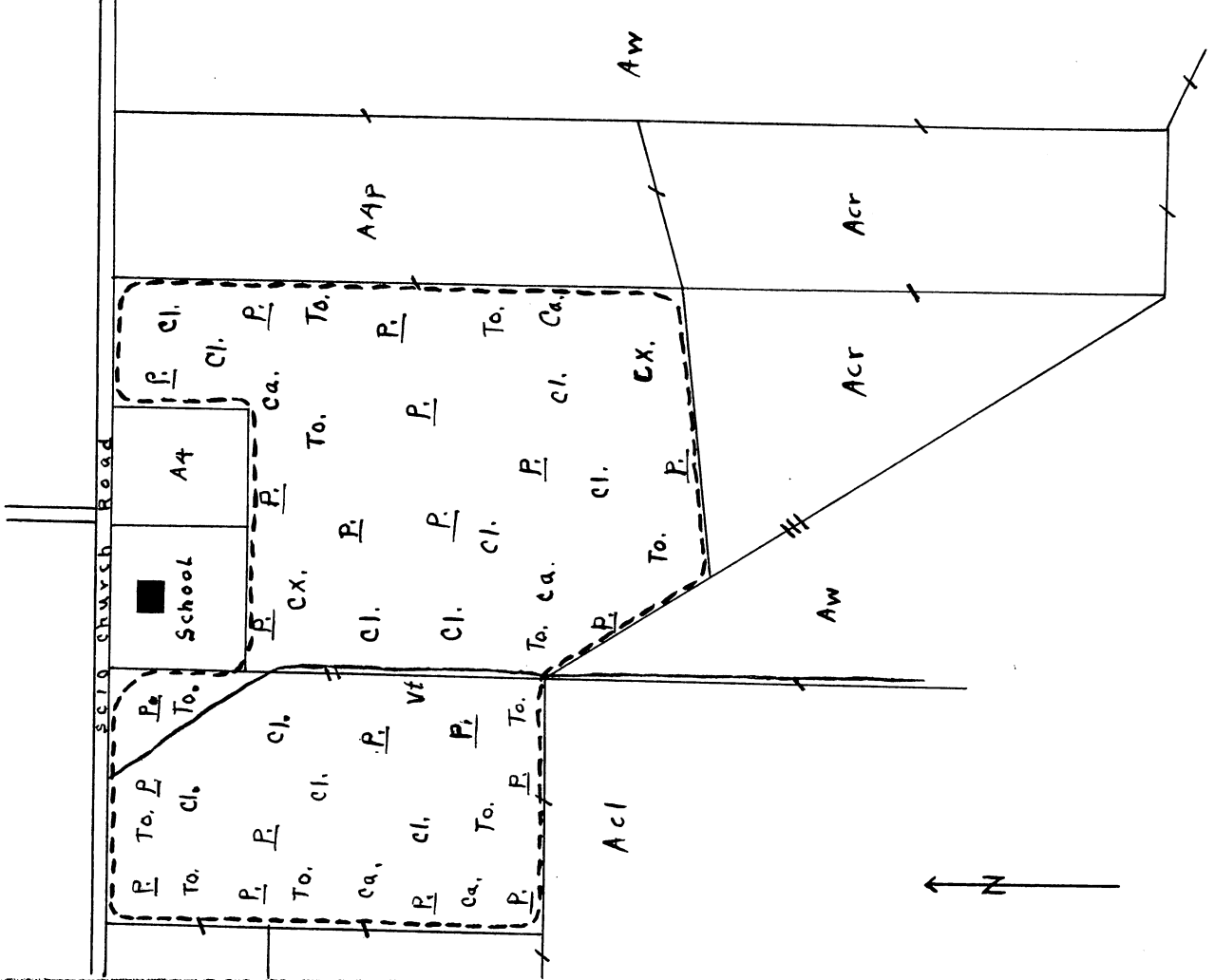
Soil type Manure loam pH 6.9
 Vegetation: Dom. Poa sp. Codom. None
 Assoc. so. To, CX, Cl, Ca, VT.

Food: Quant. 6.35 Qual. 0
 AV. 12.42
 Cover: H. 8.36 D. 24.27 S. 5.24
 Concealment: Hor. 24.38 % Vert. ---
 Surrounding Land: Des. Slightly rolling Ag., Pasture, & Woodlots.
 Food: Quant. 22.00 Qual. 33.00

AV. 22.00 Dist. Adjacent to 10 chains
 Dist. to Suitable cover 10 chains
 Grazing: Type and Intensity: Past 20 cattle-3 mo
(Unit per .86 Ac) Pres. 18 cattle-3 mo (1 unit per .90 Ac.)
 Effects on veg. Closely grazed over the entire area
 on game hab. Practically no cover present during the winter.
 Weather con.: Marsh 6°-38° BH 36° Clear-no wind or snow.
 Surrounding Area 6"-35" BH 35° " " " "
 Imm. past gen. Clear-no wind or snow - temp in 90's.
 Wildlife: observed ---

Feces Rabbit
 Dens ---
 Tracks ---
 Other signs ---

Owners value Makes good pasture since drainage.
 Notes Land pastured - Hunt with permission - hunting
during 1980 season. Does not burn because practically
no vegetation to remove. Burning formerly practiced



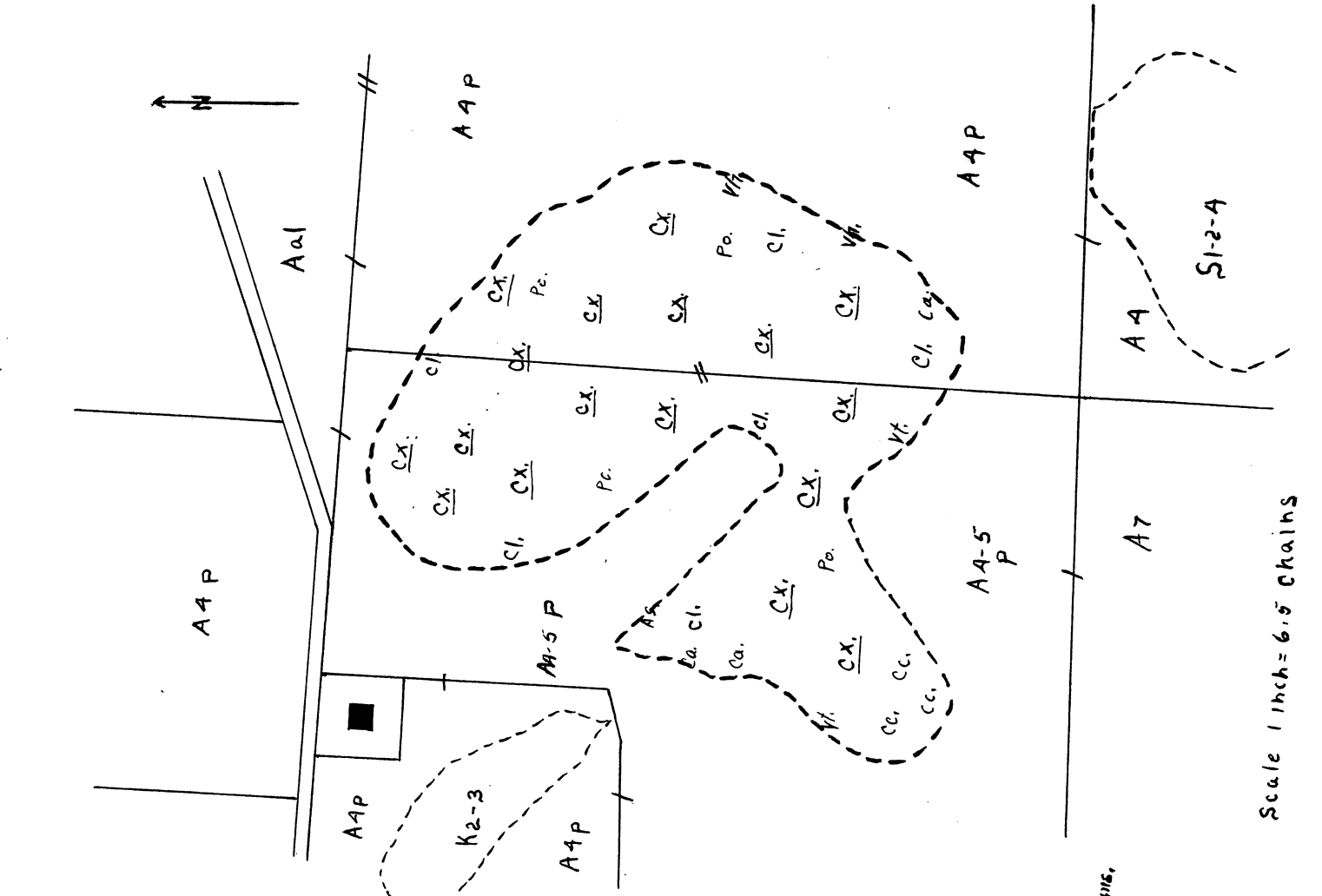
No. 32 Twp. Sharon S. 10 Loc. NW 1/4
 Sec. No. Area chs. x chs. 14.0 Ac.
 Type classes B5
 Pres. Use Pasture 4 Marsh Hay
 Past Hist. Ground morain - Old Lake Basin
Pastured for at least 10-12 years - hay cut during
the last 1-5 years.

Former size Apparently little if any change in size
 Use trend Pasture - pasture & hay will continue to be
used as pasture with occasional cuts of hay.
 Soil type Carlists Muck pH 7.0
 Vegetation: Dom. Carex laeustris Codom. Carex lanuginosa
 Assoc. so. Sc. Po. Vt., Co., As, Vlt.,

Food: Quant. 5.66 Qual. 11.00
 AV. 20.34
 Cover: H. 11.00 D. 32.41 S. 33.00
 Concealment: Hor. 28.40 % Vert. ---
 Surrounding Land: Des. Flat to rolling pasture, Ag, & Woodlot.
 Food: Quant. 22.00 Qual. 33.00

AV. 33.00 Dist. 130 chains - 20 chains
 Dist. to Suitable cover 3 chains N.E. - 6 chains S.E.
 Grazing: Type and Intensity: Past 8-10 cattle - 3mo.
(Unit - 5.70-7.02 Ac) Pres. 8 cattle - 3mo. (1 unit per 7.12 Ac)
 Effects on veg. Cover reduced to avg of 5" on entire area
on game hab. Rapid growth of some species seen of 1991
 Weather con.: Marsh 6-40° BH - 37°
Surrounding Area 6"-36° BH - 35°
 Imm. past gen. Clear - light wind - temp mild.
 wildlife: observed ---
 census ---

Feces Rabbit
 Dens ---
 Tracks Rabbit
 Other signs ---
 Owners value Fairly good pasture - some heavy ferns - which will return.
 Notes land posted but hunt with permission. Natural
drainage fair/s satisfactory. Flooded during the spring. No
artificial drainage. Cuts hay about first of October
Does not burn. About 1/2 tons hay per acre
5.7 acres in pasture e.

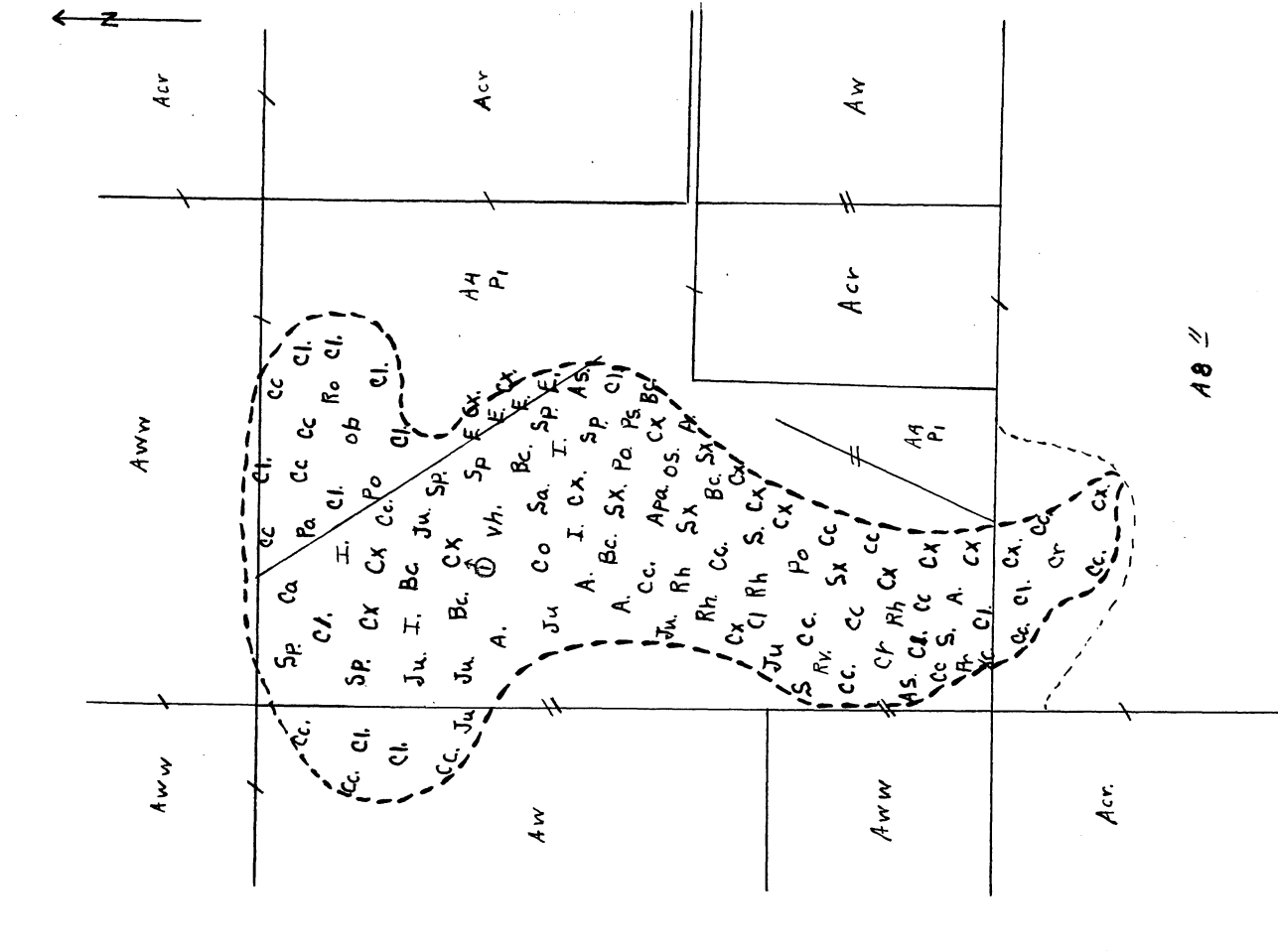


No. 33 TWP. Fredsdom S. 1 Loc. N# 1/2
 Date March 27, 1941
 Pic. No. Area: chs. x chs. 10.0 AG.
 Type classes B8
 Pres. Use Pasture
 past hist. Ground moraine. High water table type
No artificial drainage. Has burnt several times during the
last 8 years, last burning in spring of 1940. Believes area
was pastured when he bought the farm 8 years ago.
Former size extended over about 1 1/2 acres from N.W. corner.
Use trend. Owner plans to keep the area in pasture

Soil type Carlisle Muck pH 6.7
 Vegetation: Dom. Carex spp. Codom. Bidens cernua
 Assoc. so. As, A.S.P., I., SX, RS, RV, Rh, Ca, Pa, Ob,
Xs, Cr
 Food: Quant. 12.36 Qual. 22.00
 Av. 10.52
 Cover: H. 16.83 D. 31.44 S. 24.34
 Concealment: Nor. 62.33% Vert. ---
 Surrounding Land: Des. Rolling Ag. Pasture & Woodlot
 Food: Quant. 22.00 Qual. 33.00
 Av. 22.00 Dist. 2 chains
 Dist. to Suitable cover 2.8 chains
 Grazing: Type and Intensity: Past 1933-37 - 12 cattle
Pres. 8 cattle 3-4 mo. (1 unit per 1.25 ac.)
Effects on veg. Small amount of grazing - some trampling
on game hab. Over conditions some take reduced
Weather con. Marsh 6" - 44" BH = 38° 41° very winds
Surrounding Area 6" - 39° 36° BH - 38° 35°
Imm. past gen. clear with light wind
wildlife: observed Micratus, Pheasant & Quail (10)
census

Feces Pheasant, Song bird, Rabbit, Quail (3 spots)
 Dens Bird nests
 Tracks ---
 Other signs Some cock pheasant feathers in center.

Owners value Essential to his pasturing needs.
 Notes Land not posted - light hunting during past season.
Two birds known to have been killed in area. Dog has
flushed covey of quail from marsh on two occasions.
Has kept cattle on the area May to Nov. 80 acre farm with comparatively
little pasture. Insect water fairly plentiful. 19.4 ac. in pasture



Scale 1" = 6.9 chains

Date March 4, 1941

No. 34 TWP. Sharon S. 3 Loc. S 1/2
P.C. No. Area: chs. x chs. 71.00 Ac.

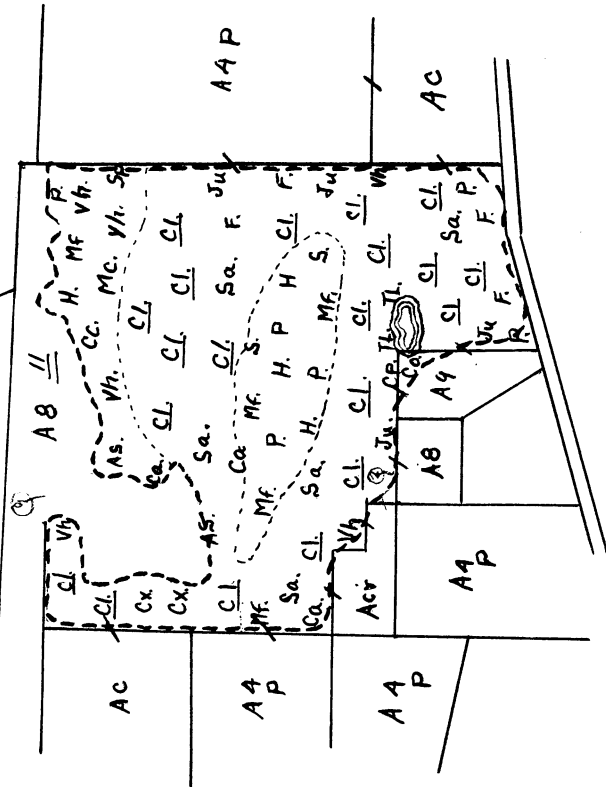
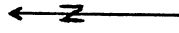
Type classes B5 - 7
Pres. Use Pasture
Past Hist. Ground margin - lake bed type
Lake gradually decreasing but otherwise little change
in area during memory of local residents.
Occasional burning (3-yr intervals - cattle)
Former size Marsh apparently increasing as an old lake dries up
Use trend To continue to be used as pasture

Soil type Carlisle Muck pH 7.0
Vegetation: Dom. Carex lanuginosa Codom. None
Assoc. So. Sa., Ca., Th., Ju., CP., Ce., Vh., Cx., Mf., As., Cc., H., Mc., Vh., S.
H., M., P., Sp., E., S.
Food: Quant. 8.75 Qual. 11.00
Av. 17.04

Cover: H. 12.60 D. 24.82 S. 26.40
Concealment: Hor. 60.28 % Vert.
Surrounding Land: Des. Flat to rolling pasture, Ag., woodlot.
Food: Quant. 22.00 Qual. 22.00
Av. 22.00 Dist. Adj. to 6 chains
Dist. to Suitable cover 13 chains to south
Grazing: Type and Intensity: Past 10 cattle (unit per 850 Ac)
Pres. 12 cattle (1 unit per 7.08 Ac)

Effects on veg. Closely grazed over much of the area.
on game hab. Cover considerably reduced.
Weather con.: Marsh 6" 21, 28° B.H. 17° 24° windy
Surrounding Area 6" 10, 20° B.H. 9° 18°
Imm. past. gen. Slows, short, and windy.
Wildlife: observed 1 Rabbit, 3 snipe, 2 black ducks, 1 B.W. teal
 census Pheasant 3 ♀, Quail 10 - with dog.

Feces Rabbit, Pheasant, Mink
Dens Muskrat house (1)
Tracks Rabbit, Pheasant, Quail.
Other signs Rabbit kill in south part
Owners value
Notes Land pasted but hunting permitted. Occasionally
get a little duck shooting on the pond. Natural drainage
only - water on majority of area when mapped.
85 acres pastured



Scale 1 inch = 13 chains

Date March 10, 1991
 No. 35 Twp. Sci O S. 22 Loc. SW 1/4
 Plo. No. Area: chs. X chs. 19.28 Ac.
 Type classes B.5-B
 Pres. Use Pasture
 Past Hist. Glacial Outwash - (Old Huron R. drainage)
Lake Basin type No artificial drainage

Former size Practically no change except center ground to swamp
 Use trend To continue to be used as pasture.

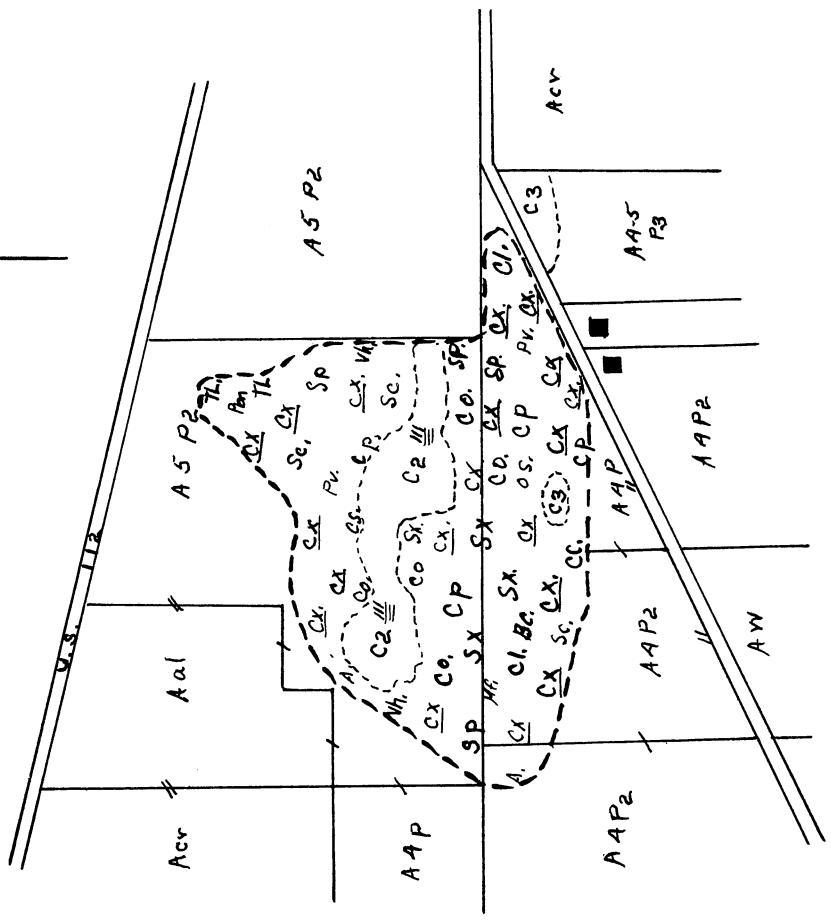
Soil type Carlisle Muck pH 7.0
 Vegetation: Dom. Carex lacustris Codom. None
 Assoc. so. Co. Sx, CP, Cs, Cl, Os, Th, Bc, Pm, Rk,
Wh, A, M, Cc
 Food: Quant. 16.56 Qual. 22.00
 Av. 15.36

Cover: H. 18.50 D. 30.38 S. 19.66
 Concealment: Hor. 64.20% Vert
 Surrounding Land: Des. Rolling Ag. and pasture.
 Food: Quant. 11.00 Qual. 39.00
 Av. 28.00 Dist. 6 chains

Dist. to Suitable cover 24 chains
 Grazing: Type and Intensity: Past 8-10 cows (1 unit per
8.1 - 10.2 ac.) Pres. 12 cows (1 unit per 6.80 ac.)
 Effects on veg. Herbaceous plants trampled, shrubs grazed
on game hab. cover reduced particularly in outer edges
 Weather con.: Marsh 6" - 36" BH - 93° Clear - winds
 Surrounding Area 6" - 90° BH - 28°
 Imm. past gen. Clear and cool - light wind
 Wildlife: observed Pheasant 2♂, 1♀; Rabbit 3.
 census

Feces Rabbit (M), Pheasant (M)
 Dens Rabbit 7
 Tracks Pheasant, Rabbit, F. Squirrel, Skunk
 Other signs

Owners value Makes poor pasture but can be used.
 Notes Land Pested - Hunted by owner and friends
Cannot burn because fire would go into swamp
in center of area.
81.7 acres in pasture.



Scales 1 inch equals 9 chains





