89-123

BASELINE INVENTORY OF A SPOTTED TURTLE (*Clemmys guttata*) POPULATION AT ROMEOVILLE PRAIRIE NATURE PRESERVE, WILL CO.

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ABSTRACT

Herein we report on the results of a status survey of the spotted turtle, Clemmys guttata, at Romeoville Prairie Nature Preserve in Will Co., Illinois. The population was studied from April - June, 1989 using capture-recapture and biotelemetry techniques.

In the course of the study, 36 spotted turtles were marked at the site. Based on these collections the total population was estimated to be 51 individuals. Males and females were not found to differ significantly in size, relative numbers, activity patterns, range lengths, or home range.

Clemmys seemingly selected sedge meadow habitat and avoided dense cattail marshes. The turtles concentrated in areas having a high water table or standing water during dry periods and dispersed into surrounding areas following heavy rains.

INTRODUCTION

The spotted turtle, Clemmys guttata, is presently known to occur in Illinois only along a narrow stretch bordering the west side of the Des Plaines River in Will Co. and including populations inhabiting Keepataw Preserve, Romeoville Nature Preserve and Lockport Prairie Nature Preserve. These three populations appear to be isolated from one another by areas of industrial development. All of the aforementioned preserves are administered by the Will Co. Forest Preserve District .

A baseline inventory of the Lockport Preserve population was conducted in 1988. Using capture-recapture techniques, we captured 32 individuals and estimated that population to be 41 individuals (Capler and Moll, 1988).

This year we conducted a similar study at Romeoville Prairie Nature Preserve with funds provided by the Will Co. Forest Preserve District, a grant from the Illinois

Department of Conservation Nongame Wildlife Conservation Fund, and an Eastern Illinois Summer Research Fellowship. Major objectives of this proposed study were to secure the following objectives:

1) To estimate the size of the population at Romeoville.

2) To begin permanent marking of individuals that will provide a foundation for continued demographic monitoring.

3) To identify spatial and temporal use of habitat within the preserve.

4) To identify limiting factors (eg. predation, competition, etc. and assess their effect on the study population.

METHODS

Turtles were captured by hand between 3 April and 11 June 1989. Capture sites were identified with plastic flagging marked with the date, time, turtle ID number and sex. Each turtle was permanently marked by notching the shell with a hacksaw blade using a code system devised by Cagle (1939). Then each turtle was routinely measured, weighed, photographed and a rubbing made of the growth annuli on the pectoral and abdominal scutes.

Eight turtles, four of each sex, were equipped with single-stage radio transmitters transmitting between 150.850 and 151.255 frequency. Transmitters did not exceed 6 grams. Tagged turtles were generally relocated once per day. Air and water temperatures, weather conditions and activity of the turtle were recorded at each location.

The preserve was divided into four areas based on vegetational groupings (Fig. 1). 1) The South Sedge Meadow Complex --- an area of sedge meadow and cattails south of the fire-break. 2) The Central Sedge Meadow Complex --- similar habitat north of the fire-break up to the south edge of an extensive cattail marsh. 3) The North Spring --- a calcareous spring located at the northwest fringe of the large cattail marsh. 4) The North Sedge Meadow Complex --- another mixture of sedge meadow and cattails north of the large cattail marsh.

The South and Central Sedge Meadow Complexes were gridded in twenty meter squares to facilitate plotting turtle movements (Figs.2,3,4). The remaining two areas were located on large scale maps using compass points taken from high power line towers.

Herein the term "home range" refers to the area occupied by an animal and utilized for feeding, reproduction and other purposes (Tinkle, 1967). Generally any relocation was considered to be part of the turtle's home range. Home ranges have been depicted by the minimum polygon method (Mohr, 1947) and their areas calculated using a compensating polar planimeter. "Range length" was calculated to assess the maximum straight line distance traveled by a turtle during the period of study.

Population estimates were derived using the Schnabel Method (Brower and Zar, 1977), a variation of the Lincoln-Peterson Index. Statistical tests of significance used

include the ordinary t-statistic for unpaired samples using a two-sided level of significance, and contingency table Chi-square.

RESULTS

In the course of the study, 52 turtles were captured including thirty-six Clemmys guttata (11 females, 11 males and 14 juveniles); 9 Chrysemys picta (5 females, 1 male, and 3 juveniles); 5 Emydoidea blandingi (3 females, 1 male, and 1 juvenile); and 2 Chelydra serpentina (1 female and 1 male). Two dead male spotted turtles were also found in the area.

The number of Clemmys in the study area was estimated to be 50.7 +/- 10.7 individuals. The sex ratio was 1:1 and the juvenile to adult ratio was 1.27/1.

The sexes were very similar in carapace length with each averaging 95 mm but females averaged heavier than males (mean 143g to 124 g). The tendency for females to exceed males in weight was strong but not statistically significant (t = -1.715; P =.1018). Juveniles averaged 73.1 mm CL and 66.6 g.

Growth annuli on the abdominal scutes of adults ranged from 7-14 for males (mean 8.8, N=11) and 8-12 in females (mean 10.3, N=10). This indicates that both sexes can attain maturity in seven or eight years. Numbers of rings at the maximum end of the range do not necessarily indicate absolute age but rather the age at which growth stopped.

Table 1 provides captures per man hour each month. Over the period of the study, turtles were captured at a rate of .23 per man-hour searched. May was the most productive month

with a rate of capture of .39 per man-hour and April was the least productive with only .08 turtles per man hour.

Morning to early afternoon was most productive search period during the day. Nearly half of the collections were made between 0900 and 1100 and 73 percent of the turtles were taken between 900 and 1300 hours (Tab. 2).

Table 3 breaks down the percent of the time allocated daily to various activities by each sex based on relocations of radio-tagged individuals. Both sexes appeared to spend the greatest part of their daily activity period inactive under water (males 45.9%; females 41.3%). The next most important category for males was basking (18.7%) followed by concealment under vegetation on land (13.1%). Females spent somewhat more time concealed on land (20.35%) and slightly less time basking. Males were found moving slightly more often (15.7%) than females (13.4%). None of these differences were statistically significant (Chi-square = 3.74; P = .4419).

Table 4 breaks down activities according to morning (before 1300) and afternoon (after 1300). Little difference was evident between morning and afternoon activities .

Of the 36 captures, 31 were made in sedge meadow habitat. Seven turtles were taken in the South Sedge Complex, 6 in the Central Sedge Complex, 3 in the North Spring Area (a calcareous spring/fen), 18 in the North Sedge Complex and 2 in flooded tire ruts of the access road which runs along the high power line towers on the West side of the

preserve.

Of the 8 radio-tagged turtles all but one maintained home ranges within the sedge meadow complexes. The exception was male (8R) which inhabited the North Spring an area of dense extensive cattail marsh.

The most dense assemblage of Clemmys was found in an area of approximately 1000 square meters designated as the "core area" of the North Sedge Complex. Fourteen spotted turtles were collected at this site. This area was relatively low and held water for longer periods than surrounding sites particularly in a series of ruts which had been made by an off road vehicle at some time in the past. Vegetation at the site was predominantly sedge (Carex) with some cattail (Typha) and horsetail (Equisetum).

The radio-tagged Clemmys moved an average of 162 meters in straight-line distance. Movements by individual turtles are listed in Table 5 and depicted in Figures 6-14. Comparing sexes, range lengths of males varied from 105 to 360 (mean 194) meters. Range lengths of females varied from 120 to 210 (mean 151) meters. The difference was not statistically significant ($t = .688$; $P = .5171$). No immatures were radio tagged hence no data on their movements are available.

Home range areas of the radio-tagged turtles showed considerable variation ranging from 487 to 26,560 (mean 7899) square meters. The mean home range of the four males was 9926 square meters in area while that of the four females was

5837 square meters. The difference in size was not statistically significant ($t = .699$; $P = .5107$).

DISCUSSION

Clemmys guttata was the most common turtle found on Romeoville Prairie Nature Preserve, being encountered at least four times as often as any other species. This was in part due to the fact that there is little permanent water available for more aquatic species. Probably the aquatic species collected were largely transients using the habitat for ephemeral sources of food or for nesting sites. The Chrysemys and Chelydra presumably came from the nearby Des Plaines River. Emydoidea may be the only other resident chelonian of the site.

Although a population of 51 spotted turtles is not large for such an extensive area, the high percentage of juveniles indicates that it is healthy and has good potential for growth.

Based on our captures per man hour index, May appeared to be the peak month for activity of Clemmys. However, the more dense vegetation in June may have simply made active turtles less obvious. On a diurnal basis, turtles were most active between the hours of 0900 and 1100. However, some turtles were captured in all hours searched (0730 to 0600).

Few differences were observed in the activity patterns of the sexes. Based on telemetry data, both spent about equal time basking, in water, hiding, and moving. Some

difference was noted in the times of activity with females showing a slight but statistically insignificant tendency to bask earlier while males tended to be found moving earlier.

Optimum habitat for Clemmys on the preserve appears to be sedge meadow and the associated habitats around its fringes. The extensive cattail marsh yielded no turtles other than those associated with the North Spring Site. It likely that the core area of the North Sedge Meadow Complex was particularly favorable because it held water for longer periods than its surroundings. This was due both to a high water table in the area and to the deep ruts from tire tracks at the site.

The importance of the high water table was demonstrated when after heavy rains no turtles could be found in the core area but several originally captured there had moved into the surrounding area. The map of 1L11R (Fig. 14) exemplifies this pattern. All of its movements outside of the core area came following heavy rains in late May and early June.

Similarly 8R which inhabited the semipermanent North Spring had been among the most sedentary of the radio-tagged turtles but even 8R made an extensive northward sally following these heavy rains. At the same time two spotted turtles were found moving along puddles in the access road on which no turtles were seen at other times.

The above information indicates the importance of rainfall and water levels in determining turtle concentrations and movements. One management technique

[redacted] One management technique suggested by these observations is to create ditches in suitable sites to maintain the turtles during drought periods.

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Table 1. Capture rate of Clemmys guttata during the Spring of 1989 at Romeoville Prairie Nature Preserve.

Month	Man-Hours searched	Turtles Captured		Turtles/hr searched
		New	Recapt	
April 1989	141.25	10	2	0.08
May 1989	124.0	24	25	0.39
June 1989	15.0	2	2	0.27
Totals	280.25	36	29	0.23

Table 2. Hourly capture rate of Clemmys guttata during the spring of 1989 at Romeoville Prairie Nature Preserve.

Time	# Captures	% of all Captures
0900-1000	8	22
1001-1100	10	27
1101-1200	4	11
1201-1300	5	13
1301-1400	1	3
1401-1500	4	11
1501-1600	1	3
1601-1700	3	8
1701-1800	1	3
	37	100

Table 3. Time allotted to various activities by eight radio-tagged Clemmys guttata (4 males and 4 females) during the spring of 1989 at Romeoville Prairie Nature Preserve.

Activity	Males		Females	
	# obs.	%	# obs.	%
Basking	37	18.7	31	18.0
Submerged	91	45.9	71	41.3
Under Vegetation	26	13.1	35	20.3
Buried in Substrate	13	6.6	12	7.0
Moving	31	15.7	23	13.4
Total	198	100.0	172	100.0

Table 4. Morning (prior to 1300) and afternoon (after 1300) activity patterns, based on observations, of eight radio-tagged Clemmys guttata during the spring of 1989 at Romeoville Prairie Nature Preserve.

	Males		Females	
	a.m.	p.m.	a.m.	p.m.
Basking	17	18	16	11
Submerged	40	40	31	44
Under Vegetation	17	20	13	23
Buried	3	9	4	5
Moving	15	11	11	11

Table 5. Range length and home range of eight radio-tagged Clemmys guttata inhabiting Romeoville Prairie Nature Preserve April - June 1989.

Turtle	Sex	Range Length (Meters)	Home Range (Sq. Meters)
1R	F	120	7360
2R	F	210	7200
3R	M	360	26560
8R	M	190	487
11R	M	105	4800
10L	M	120	8000
12L	F	140	5760
1L11R	F	135	3028

Mean Range Length - All turtles = 172.5 m
Males = 193.75 m
Females = 151.25 m

Mean Home Range - All turtles = 7881 sq. m
Males = 9926 sq. m
Females = 5837 sq. m

FIGURE LEGENDS

Figure 1. Study areas and vegetation map of Romeoville Prairie Nature Area.

Figure 2. The locations of two grids indicated by the two boxes outlined on the vegetation map, one in the South Sedge Meadow Complex and one in the Central Sedge Meadow Complex.

Figure 3. Form used to plot locations of turtles moving within the gridded area of the Sourth Sedge Meadow Complex. Each box represents a 20 meter square.

Figure 4. Form used to plot locations of turtles moving within the gridded area of the Central Sedge Meadow Complex. Scale is the same as in Figure 3.

Figure 5. Capture sites of 34 spotted turtles taken during the spotted turtle survey April - June 1989 at Romeoville Prairie Nature Preserve.

Figure 6. Movments and home range of 1R a female spotted turtle (101 mm CL), within the South Sedge Complex. Squares are 20 meters per side.

Figure 7. Movements and home range of 2R, a female spotted turtle (95 mm CL), within the Central Sedge Complex.

Figure 8. Movements and activity range of 3R, a male spotted turtle (100 mm CL), within the Central Sedge Complex.

Figure 9. Two relocations of 3R in the South Central Sedge Complex resulting from a sally outside of the Central Sedge Complex between May 28 and June 1 following a period of heavy rain. As most movements in this sally were outside of gridded area, they have not been plotted.

Figure 10. Movements and activity range of 8R, a male spotted turtle (111 mm CL), in the area of the North Spring. The map does not include a sally of 140 meters to the North and West of the spring which occurred from 1 to 14 June when its radio was lost.

Figure 11. Movements and home range of 11R, a male (94 mm CL), within the South Sedge Meadow Complex.

Figure 12. Movements and home range of 10L, a male (91 mm CL), within the South Sedge Meadow Complex.

Figure 13. Movements and home range of 12 L, a female (96 mm CL), within the South Sedge Meadow Complex.

Figure 14. Movements and home range of 1L11R, a female (101 mm CL), within the North Sedge Meadow Complex. The "core area" is indicated in the lower portion of the diagram.

FIGURE 1

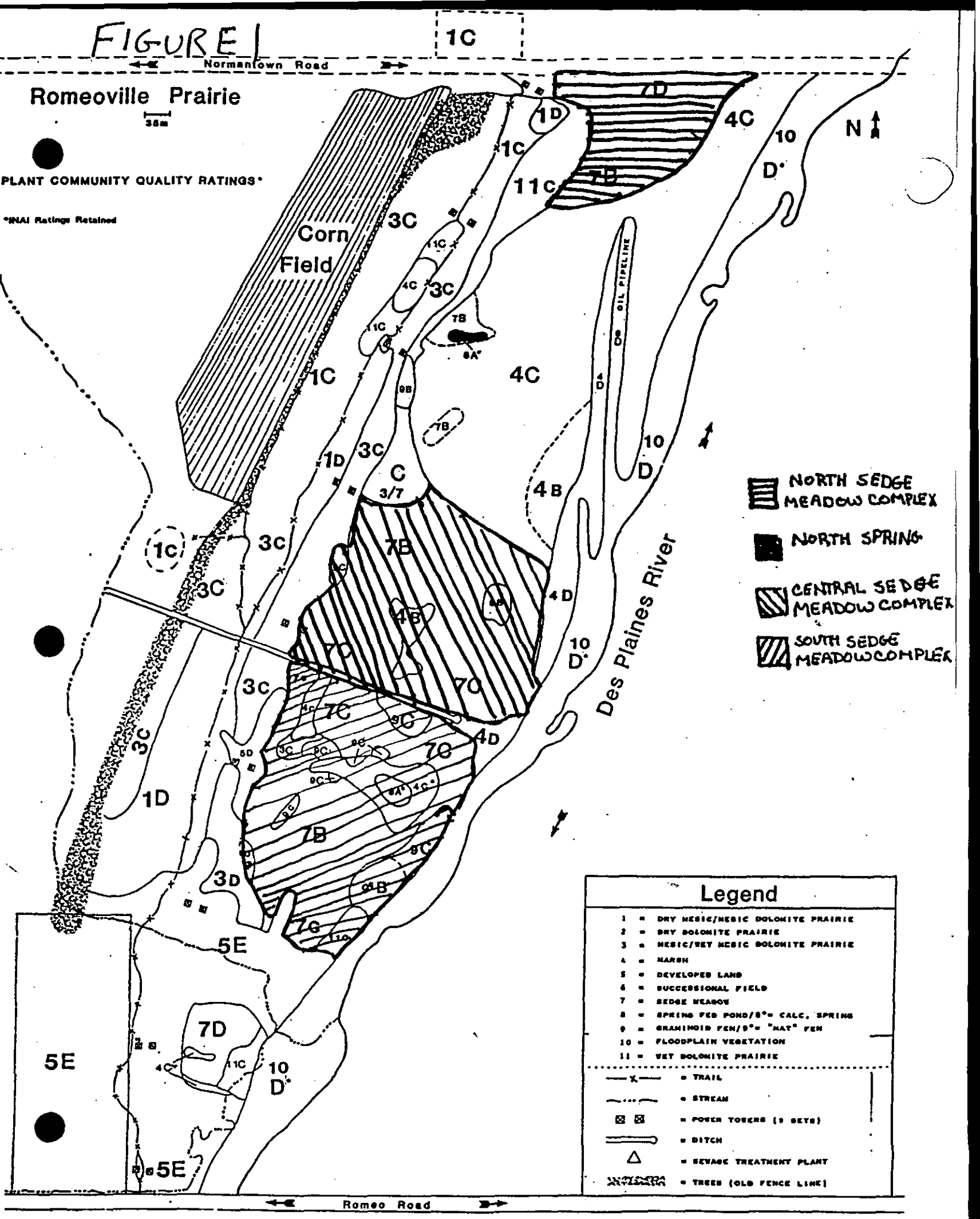
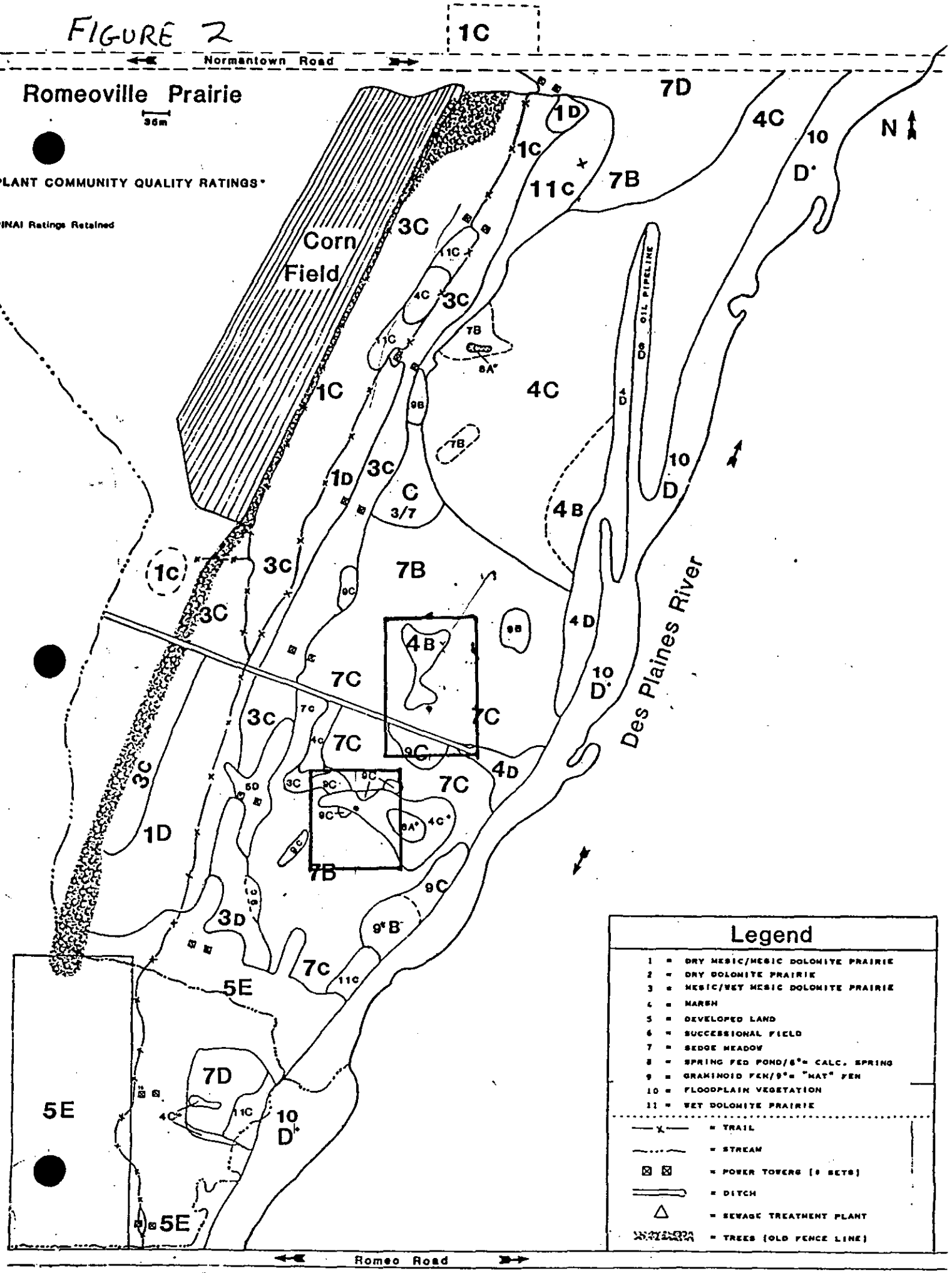

Normantown Road
Romeoville Prairie
35m
PLANT COMMUNITY QUALITY RATINGS*
*INAI Ratings Retained
Corn Field
OIL PIPELINE
Des Plaines River
N
NORTH SEDGE MEADOW COMPLEX
NORTH SPRING
CENTRAL SEDGE MEADOW COMPLEX
SOUTH SEDGE MEADOW COMPLEX
Legend
1 = DRY MESIC/MESIC DOLOMITE PRAIRIE
2 = DRY DOLOMITE PRAIRIE
3 = MESIC/WET MESIC DOLOMITE PRAIRIE
4 = MARSH
5 = DEVELOPED LAND
6 = SUCCESSIONAL FIELD
7 = SEDGE MEADOW
8 = SPRING FED POND/8*= CALC. SPRING
9 = GRAMINOID FEN/9*= "MAT" FEN
10 = FLOODPLAIN VEGETATION
11 = WET DOLOMITE PRAIRIE
= TRAIL
= STREAM
= POWER TOWERS (3 SETS)
= DITCH
= SEWAGE TREATMENT PLANT
= TREES (OLD FENCE LINE)
Romeo Road

FIGURE 2


1C
Normantown Road
Romeoville Prairie
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INAI Ratings Retained
Corn Field
OIL PIPELINE
Des Plaines River
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Romeo Road
Legend
1 = DRY MESIC/MESIC DOLOMITE PRAIRIE
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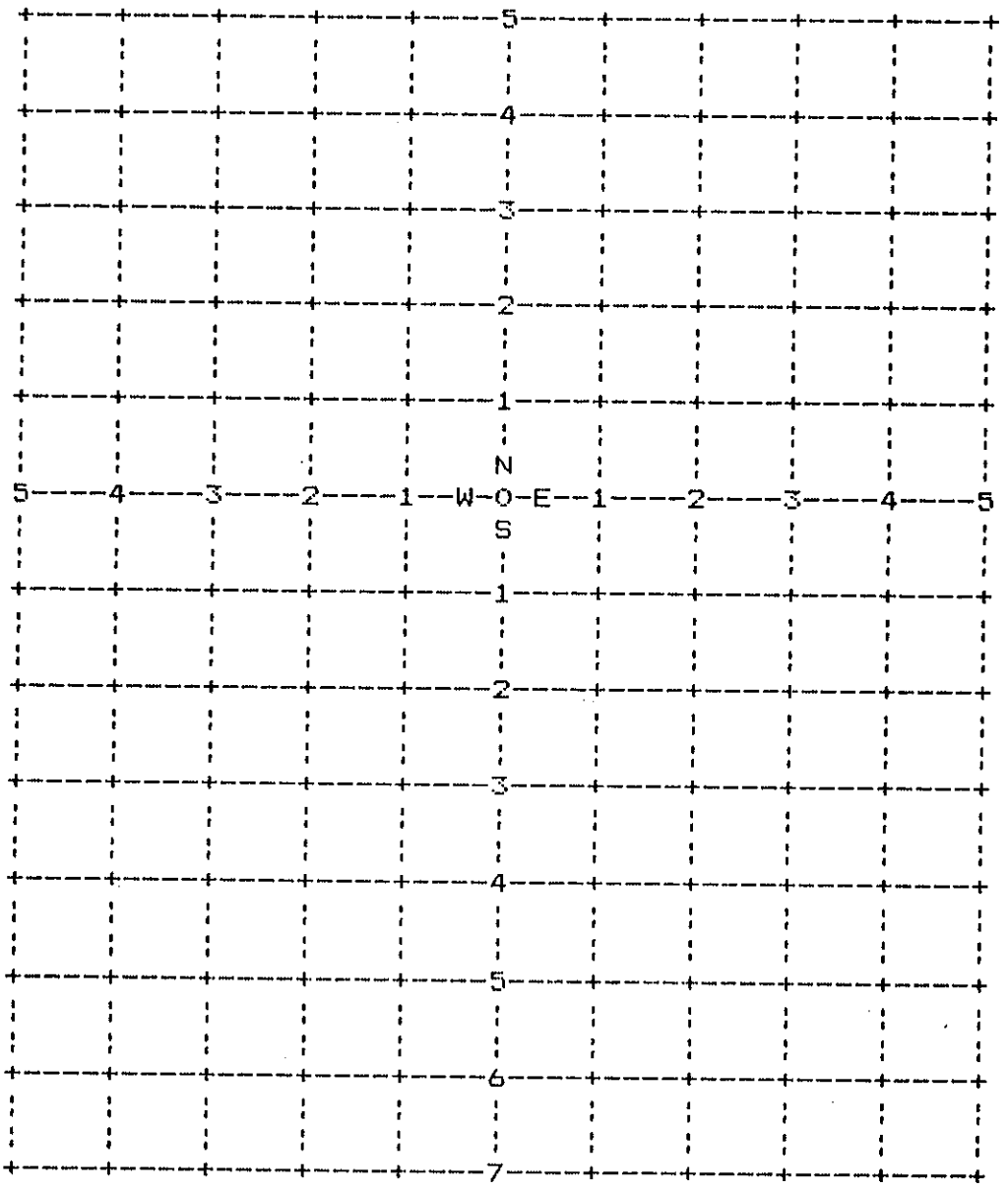
8 = SPRING FED POND/8*= CALC. SPRING
9 = GRAMINOID FEN/9*= "MAT" FEN
10 = FLOODPLAIN VEGETATION
11 = WET DOLOMITE PRAIRIE
= TRAIL
= STREAM
= POWER TOWERS (8 SETS)
= DITCH
= SEWAGE TREATMENT PLANT
= TREES (OLD FENCE LINE)

Clemmys guttata

ROMEOVILLE PRAIRIE PRESERVE
SOUTH SEDGE COMPLEX

DATE_____ TIME_____ TURTLE ## _____



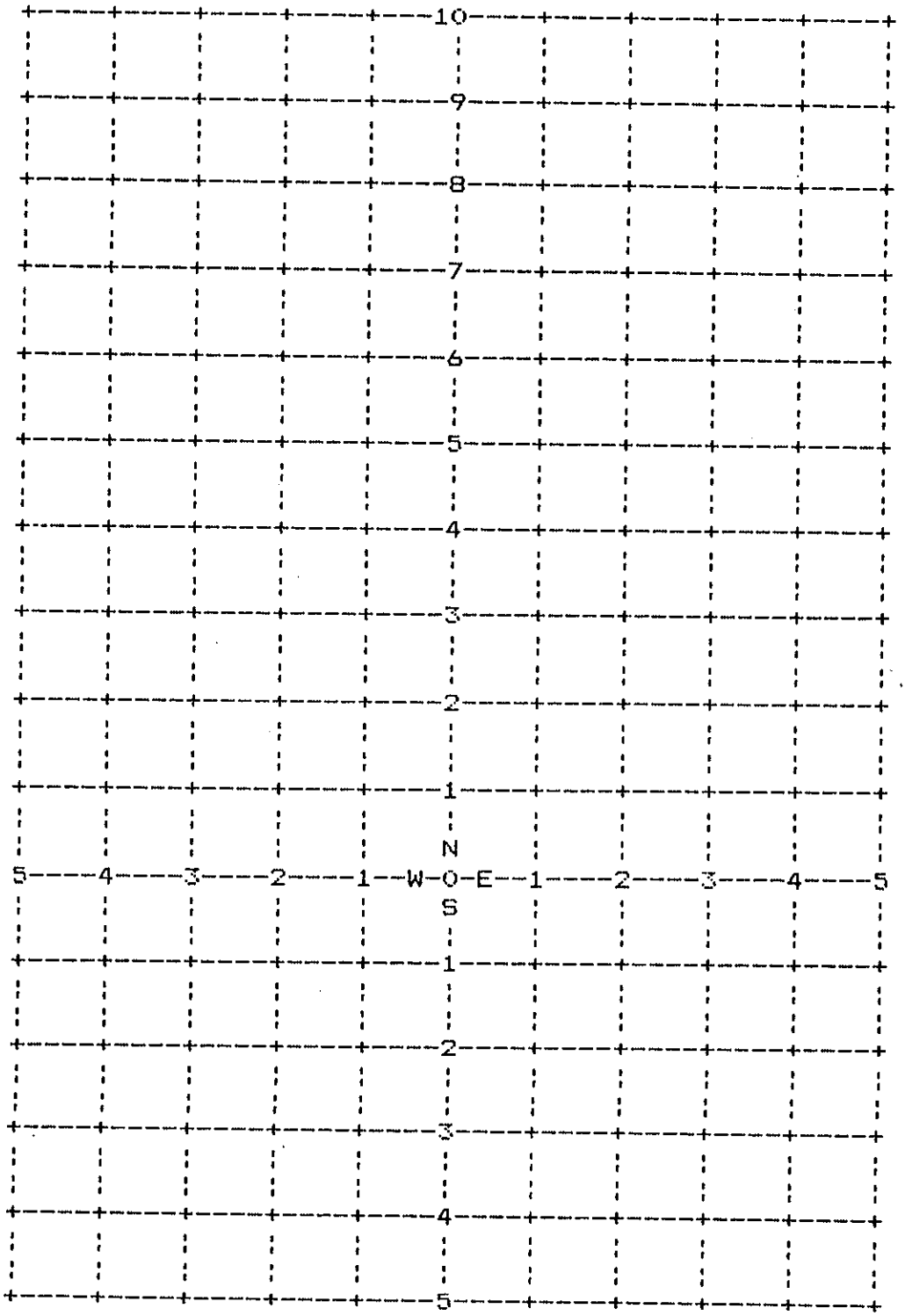
NOTES:

20 sq M

Clemmys guttata

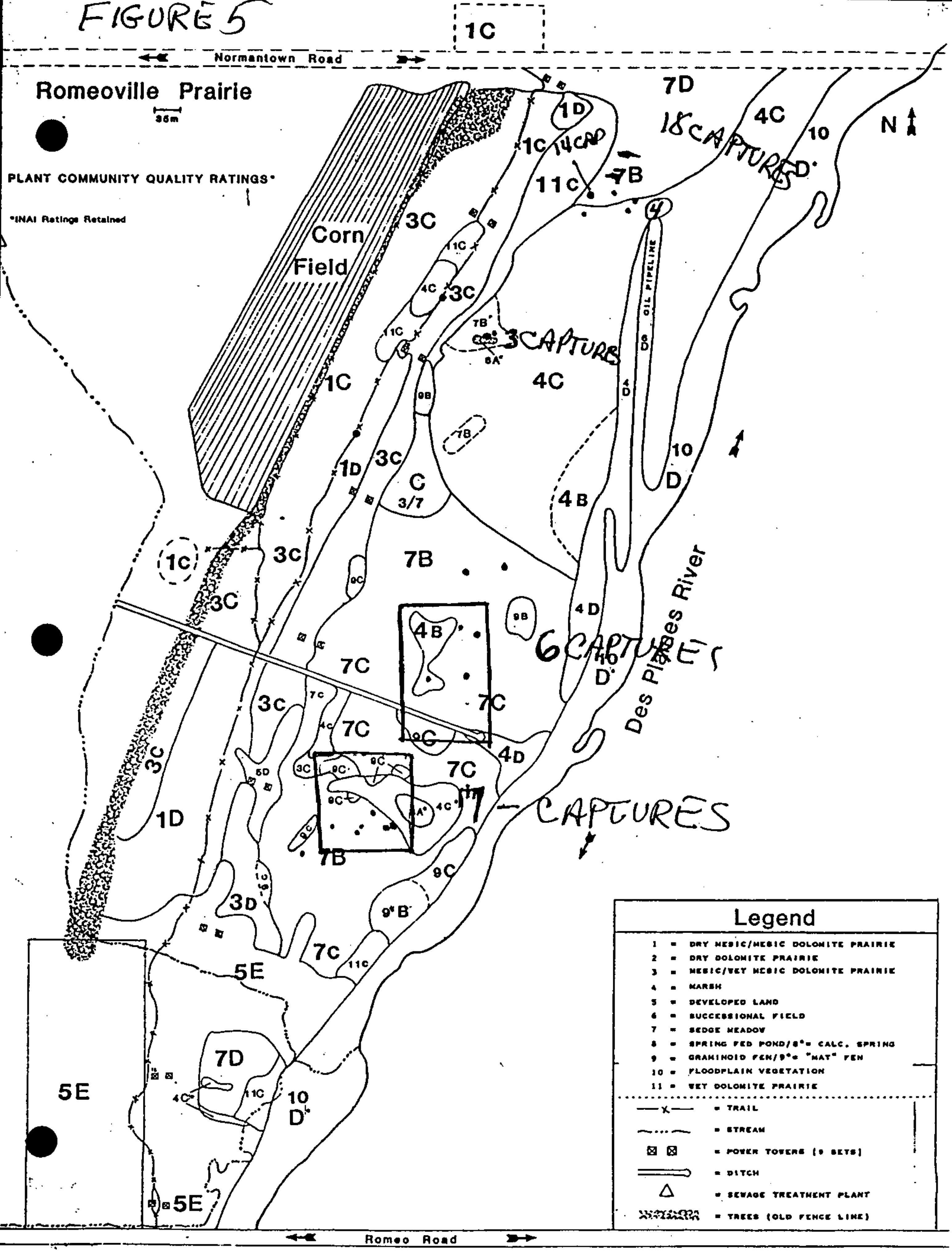
ROMEOVILLE PRAIRIE PRESERVE
CENTRAL SEDGE COMPLEX

DATE_____ TIME _____ TURTLE ## _____



NOTES:

FIGURE 5


Normantown Road
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35m
PLANT COMMUNITY QUALITY RATINGS*
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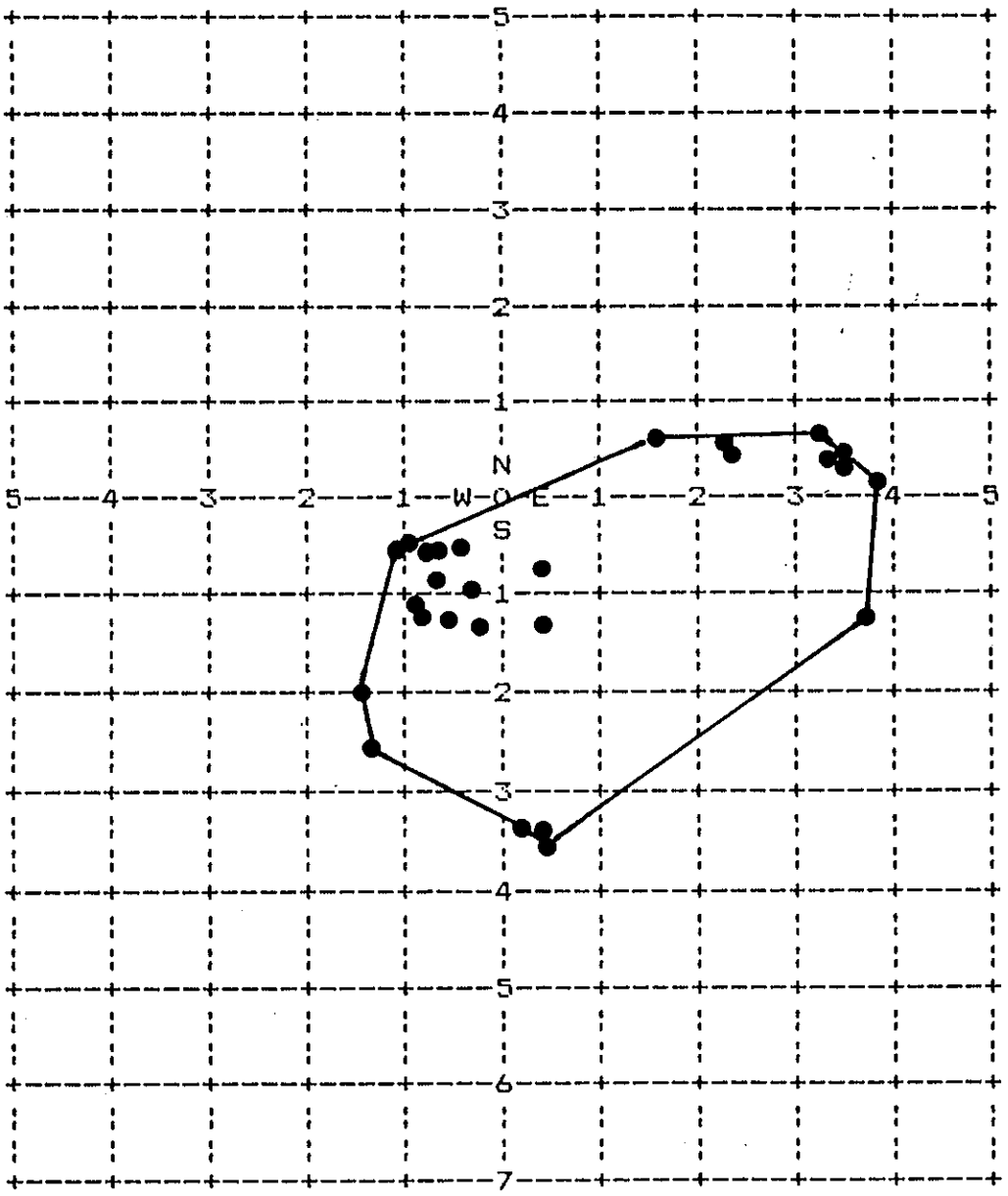
17 - CAPTURES
Legend
1 = DRY MESIC/MESIC DOLOMITE PRAIRIE
2 = DRY DOLOMITE PRAIRIE
3 = MESIC/WET MESIC DOLOMITE PRAIRIE
4 = MARSH
5 = DEVELOPED LAND
6 = SUCCESSIONAL FIELD
7 = SEDGE MEADOW
8 = SPRING FED POND/8* = CALC. SPRING
9 = GRAMINOID FEN/9* = "MAT" FEN
10 = FLOODPLAIN VEGETATION
11 = WET DOLOMITE PRAIRIE
= TRAIL
= STREAM
= POWER TOWERS (SETS)
= DITCH
= SEWAGE TREATMENT PLANT
= TREES (OLD FENCE LINE)

1 R



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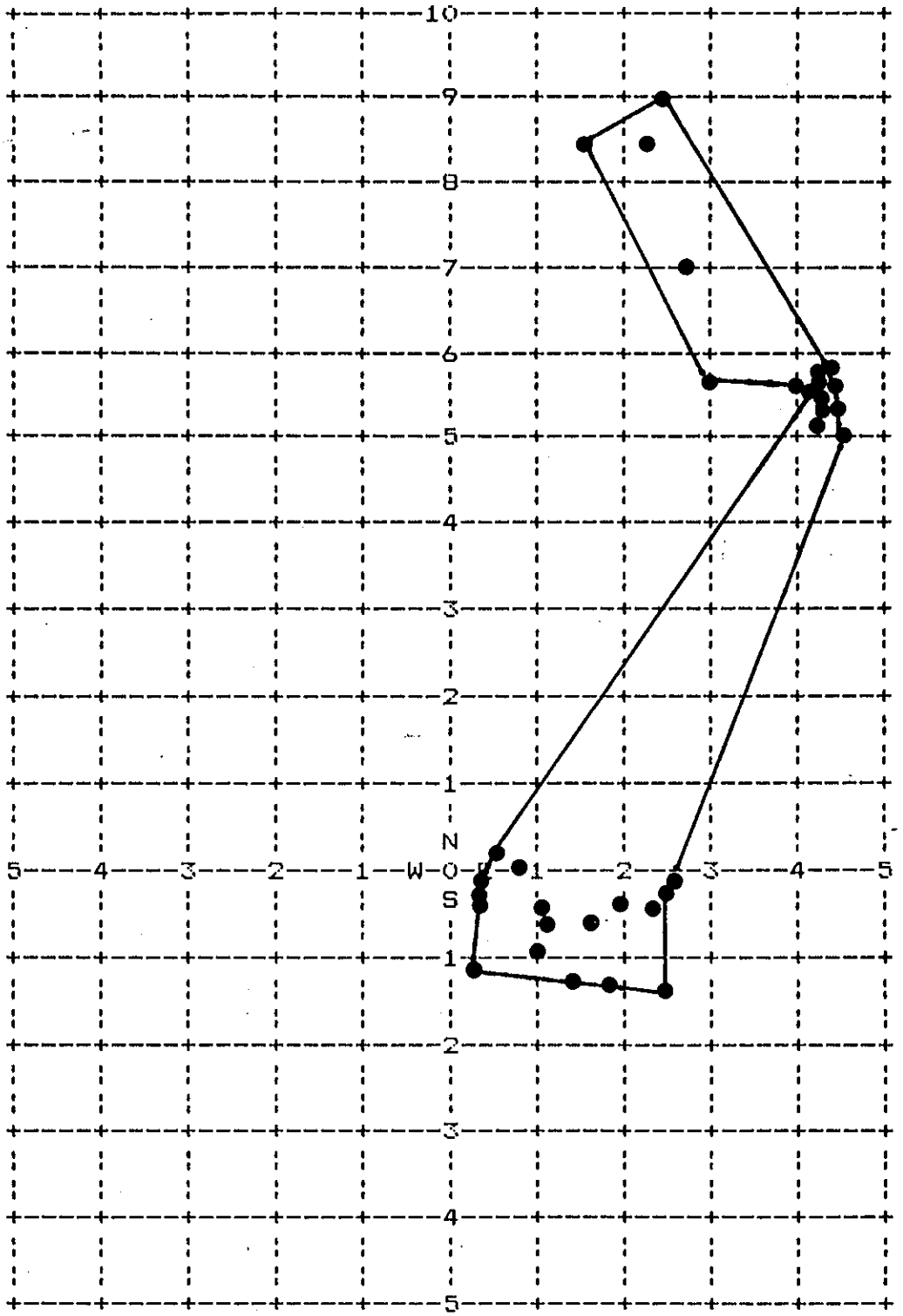

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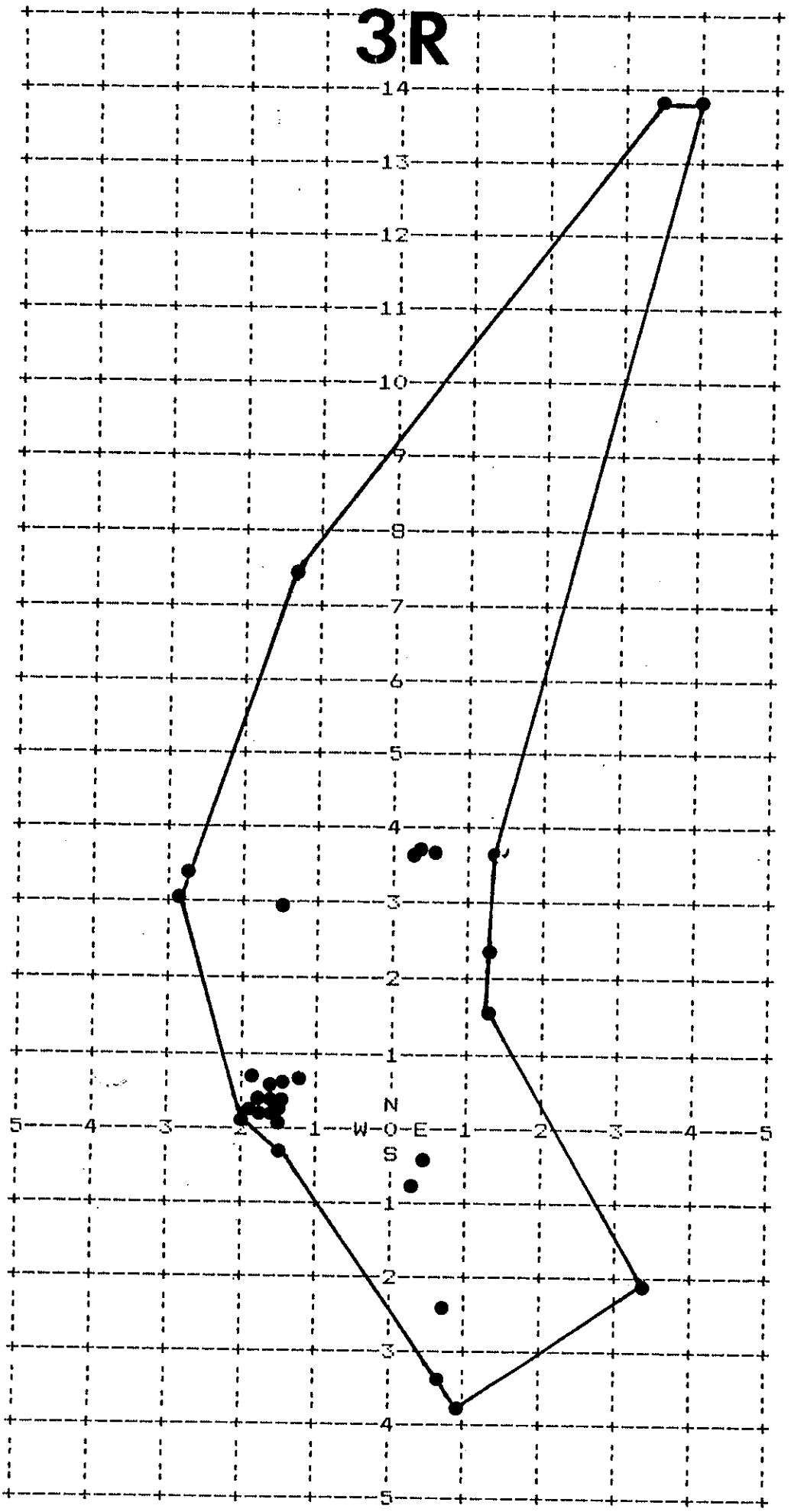

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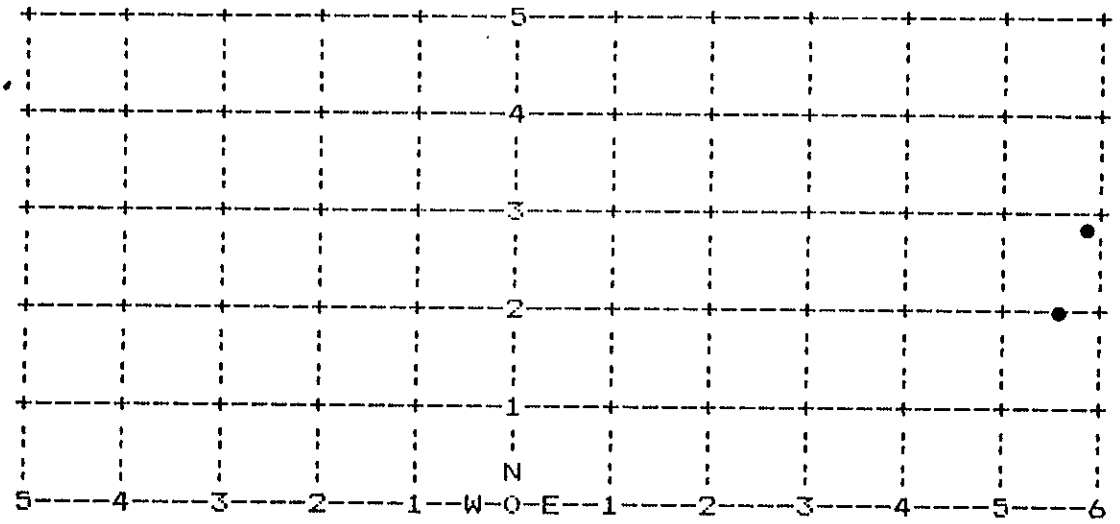

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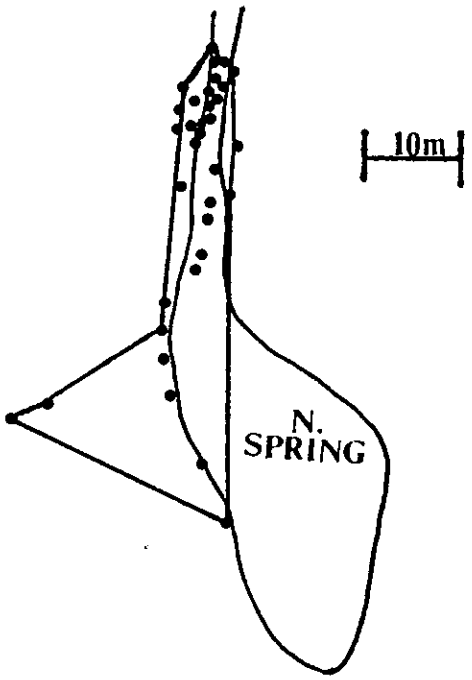
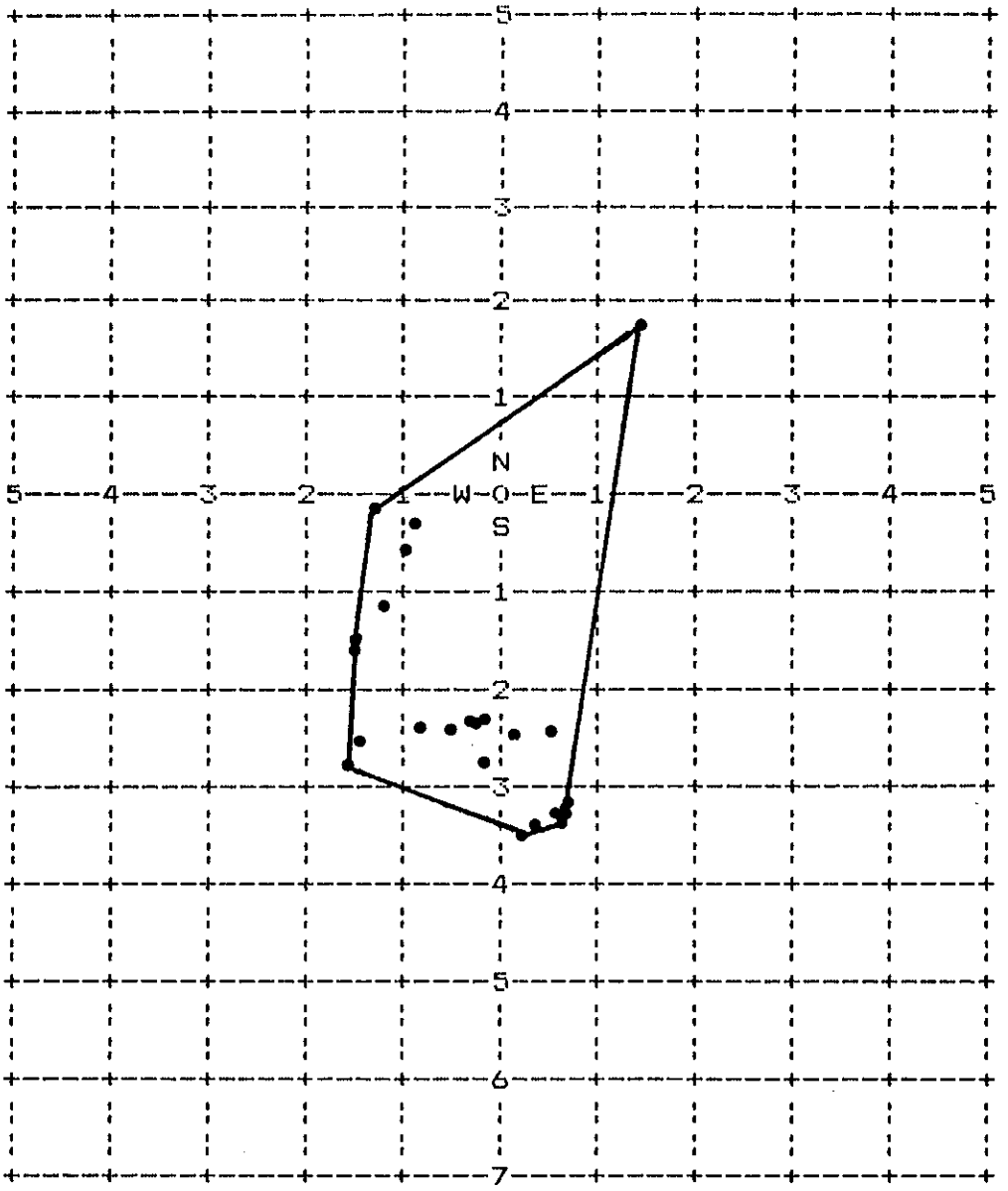
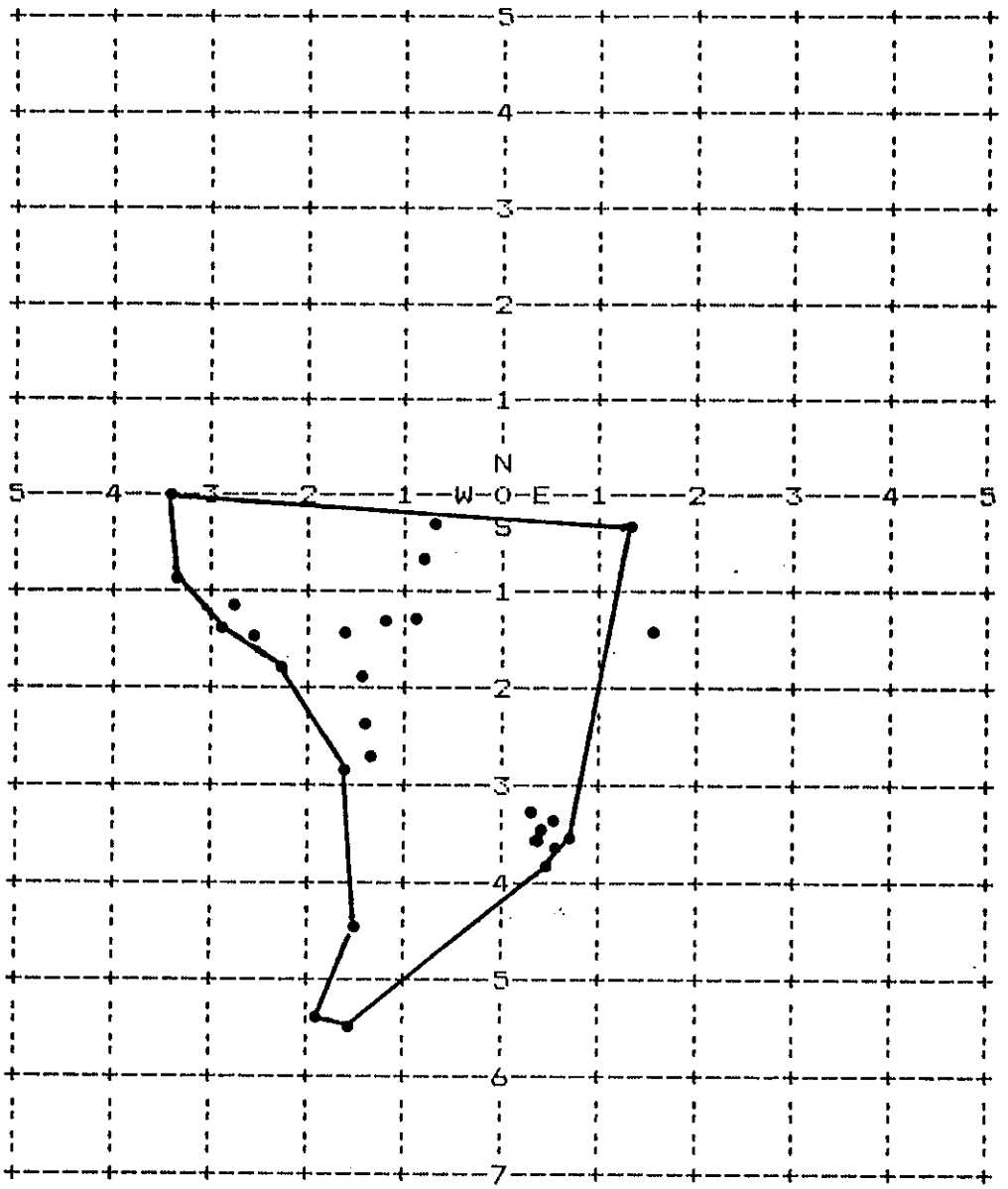


11R



10L



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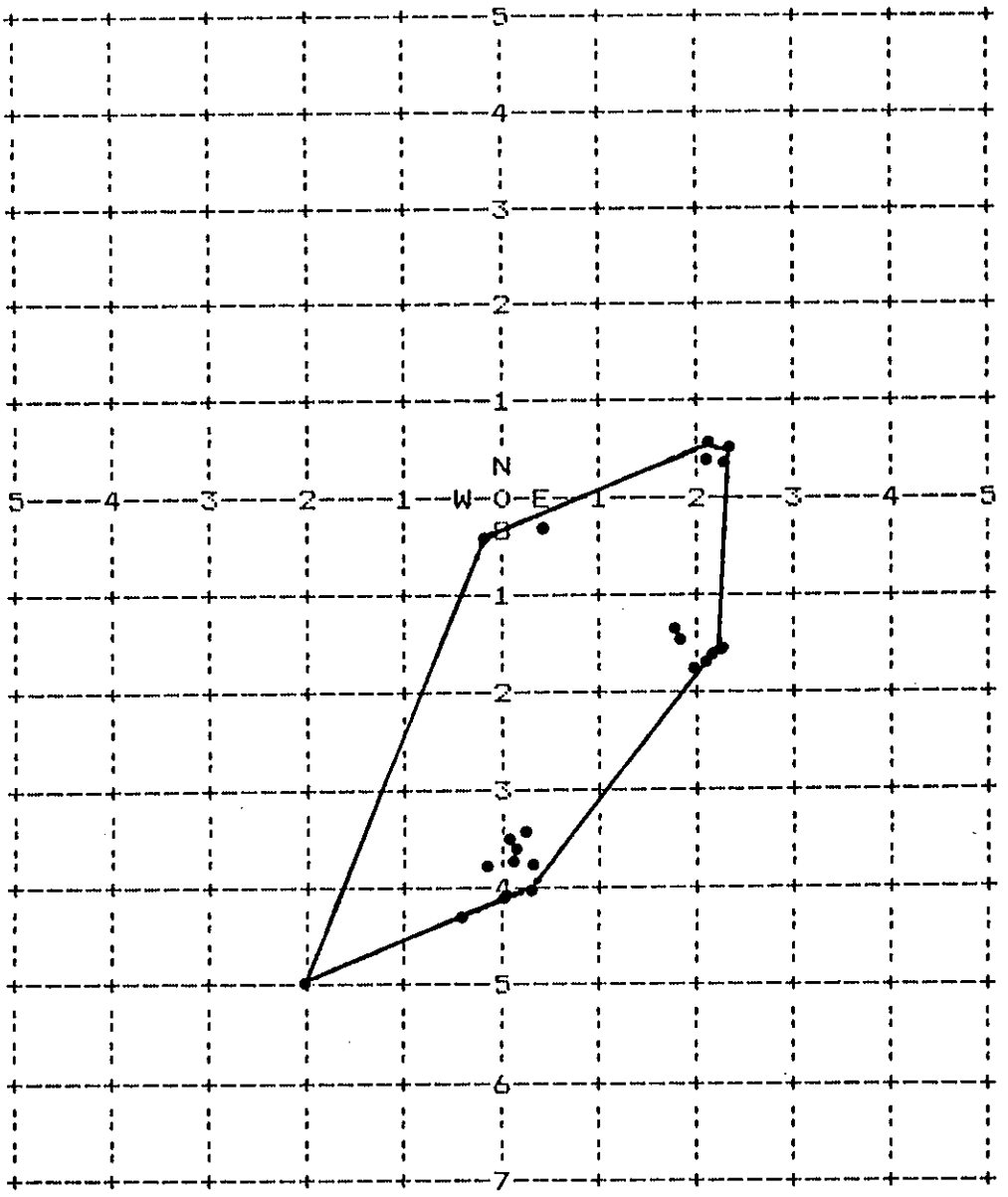

1L11R