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by

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ABSTRACT

BREEDING BIRDS FOUND ON SHELTEROOD-CUT OAK STANDS IN BUCKINGHAM COUNTY, VIRGINIA

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The Breeding Bird Census (BBC) technique was used to study breeding bird populations on two paired shelterwood-cut oak stands in Buckingham County, Virginia. The four plots are part of a study to determine oak regeneration following controlled burns in the Virginia piedmont. There is an interest in determining how shelterwood-cut plots affect the breeding birds of Virginia. A total of twenty-seven bird species established and defended territories among the four plots. Ten bird species defended territories on all four plots. All of these species were birds characteristic of forest habitats.

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Introduction

The purpose of this study was to collect baseline data describing the breeding birds on two paired shelterwood-cut oak stands in Buckingham County, Virginia. This project was designed to investigate the impact of current forestry management practices in the piedmont of Virginia on the area's breeding bird populations. The goal of the study is to identify species and densities of breeding birds that occupy recently established shelterwood-oak stands.

Five years after a shelterwood harvest, one of the plots from each paired-plot stand will be burned. Data collected during the years preceding and following the burn can be compared to determine how shelterwood management techniques affect bird populations. The method used to determine the breeding bird species and their density was the Breeding Bird Census (BBC). Censuses were conducted on four BBC plots. The four BBC plots are Kyanite One, Kyanite Two, Loth One, and Loth Two. The long-term goal of this project is to continue conducting surveys and collecting data on the four BBC plots in order to determine bird reactions to habitat alterations due to controlled burning and harvesting of oaks.

When planning to harvest trees, a forest management plan should be considered in order to insure the highest economical returns possible and the long-term health of the forest (Land Owner Resource Centre, 1999). When developing a harvest plan the best silvicultural system should be used. Three main silvicultural systems are: the selection system, the shelterwood system, and the clear-cut system. The Virginia Department of Forestry (VDF) and the Virginia Department of Game and Inland Fisheries (VDGIF)

chose the shelterwood system to promote oak regeneration on the plots studied. A shelterwood system works by harvesting mature trees in a series of two or more partial cuts (Land Owner Resource Centre, 1999). The cuts stimulate the germination and growth of a new forest under the shade of mature trees. Meanwhile, the mature trees provide the seeds needed for regeneration of the site. There are three different kinds of harvests that can be stimulated using the shelterwood system.

A preparatory cut thins the forests in order to give selected trees room to grow large crowns. This method is beneficial to birds because large crowned trees provide more seeds than small crowned trees (Land Owner Resource Centre, 1999). This type of cut can be performed when there is a shortage of large crowned trees on the plot (Land Owner Resource Centre, 1999). A seed cut removes about half of the mature trees in the stand. This allows sunlight to reach the forest floor, which stimulates the germination and growth of seedlings. A removal cut harvests all of the mature trees. It can be done all at once or in a series of partial harvests. This final removal is only conducted when there is a dense carpet of saplings taller than 1.5 meters (Land Owner Resource Centre, 1999). A removal cut allows the saplings to have full sunlight that encourages the rapid growth of a new forest.

The Department of Game and Inland Fisheries used the seed cut method combined with controlled-burns. This type of shelterwood system produces an even-aged, fast-growing forest. It favors mid-tolerant species such as oak because oak can germinate in shade but later requires sunshine to survive (Land Owner Resource Centre, 1999).

A major challenge for resource managers in the eastern hardwood forest of North America is regenerating oak stands on productive sites (Brose and VanLear, 1998). The problem is not that oak trees fail to germinate, instead, they lose apical dominance due to the dense shade of the canopy. If the amount of shade is not reduced, the new oak regeneration gradually dies, allowing more shade-tolerant species, such as American Beech (*Fagus grandifolia*) and Red Maple (*Acer rubrum*) to dominate. These shade-tolerant species will slowly replace dominant oaks in the upper canopy.

The shelterwood system is often recommended to regenerate oak stands because it reduces the shade in a stand. This allows existing oak regeneration to develop size and mass in the root system (Brose and VanLear, 1998). Controlling the oak tree's competition while improving both the oak's root and stem systems are essential in maintaining oak stands on productive sites.

Prescribed fire or controlled burning has been recommended to favor oak regeneration by reducing acorn insect pests, preparing seedbeds, and reducing competing vegetation (Brose and VanLear, 1998). Oak saplings establish an extensive root system within the first few years of growth. Oak saplings' apical growth seems slow compared to the fast growth of Red Maples and Tulip Poplars (*Liridodendron tulipifera*). A controlled burn conducted in shelterwood stands should allow for oak regeneration through eliminating or reducing competition (McDonald, 1997). The young oaks will be able to survive the burn due to their extensive root system. Other species without extensive root systems will die (e.g., Red Maple, Tulip Poplar), thus the oaks will have less competition. A study conducted by Brose and VanLear (1998) found that Prescribed fires improved oak advance regeneration with spring burning provided the most benefit.

In 1996, two state agencies initiated a study that would track densities of breeding bird populations in shelterwood oak stands and their population responses to controlled burns (McDonald, 1997). Both of these agencies, the Virginia Department of Forestry (VDF) and the Virginia Department of Game and Inland Fisheries (VDGIF), own land in Buckingham County, where the four study plots are located. These oak stands are located in the middle of the piedmont region of Virginia. This report describes the first year's collection of baseline data for Kyanite One, Kyanite Two, Loth One, and Loth Two. Plans are to continue this study, thus making this preliminary data for a multi-year study.

The Breeding Bird Census (BBC) method used in this study provides data concerning the numbers and densities of breeding birds in various habitats. The BBC was initiated in 1914 by the former United States Bureau of Biological Survey (Breeding Bird, Census 1999). In the 1920's, The National Audubon Society took on the responsibility of administering the program. Breeding Bird Censuses were first published in *Audubon Field Notes* and *American Birds* during 1937 through 1984. Currently, the Cornell Laboratory of Ornithology is computerizing the BBC data (Breeding Bird Census, 1999). The BBC is a valuable tool used to determine how populations of breeding birds are affected by changes in habitat. It is especially useful to determine how birds are affected due to the increased trend toward removing "weed" trees in order to have maximum production of the most desirable species (Hall, 1964). BBCs are rarely conducted, even though the census gives reliable data. Only a few observers choose to assist with the task of compiling information about breeding-bird populations. This may be attributed to the amount of preparation and time that is demanded in order to have an accurate BBC.

Four major objectives for the BBC that have been used for almost fifty years are: to determine the species and densities of breeding birds found in each habitat type throughout North America, to measure the effects of various land-use practices on breeding bird populations, to quantify the amount of yearly variation in densities of breeding birds occupying various habitat types, and to establish the nesting requirements for each species of birds (Engstrom, 1998).

Most BBC plots are located at sites that are relatively free from human disturbance, such as parks, wildlife refuges, and nature preserves. The exact location of a BBC plot is determined by the individual setting up and conducting the census. A summary of the habitats under census by the BBC has never been prepared (Breeding Bird Census, 1999). The vast majority of BBC plots has been set up in forested communities. The distribution of BBC plots reflects the distribution of people willing to conduct the counts. Preliminary studies indicate that BBC plots tend to be grouped within a relatively small number of states and provinces (Breeding Bird Census, 1999). Most plots are primarily in eastern North America, while there are large areas where few censuses have ever been conducted (Breeding Bird Census, 1999).

The exact size and dimensions of a BBC plot are up to the discretion of the observer. The BBC recommends a minimum of 10 hectares in closed habitats and 40 hectares in open habitats (Breeding Bird Census, 1999). The BBC is designed to determine the numbers of breeding birds present on the plot (McDonald, 1997). The spot-mapping method is used to accomplish this task. The spot-mapping method estimates population densities for each species present in the plot. This method was initially described by Williams (1936) and has only been slightly modified (Breeding Bird

Census, 1999). Spot-mapping records the locations of all singing males and pairs present on the study plot during the breeding season. When these locations are analyzed for the entire breeding season, the territory of each species can be identified. Assuming that each territory is occupied by a breeding pair, the number of territories can be translated into the number of breeding pairs on a plot during each year (Breeding Bird Census, 1999). "The spot-mapping technique has been noted as the best method for measuring the relative abundance of birds over an extended period of time" (McDonald, 1997).

The BBC, like other surveys and censuses, are only as accurate as the observer conducting the census. The observer must be able to identify bird species by both sight and sound. The locations of the bird and possible nest locations are recorded on data sheets. This compensates for a bird that may be just visiting the plot on a rare occasion or birds being counted more than once.

When comparing data from individual plots to other BBC plots the size, geography, and structure of the plots must be considered. Additionally, changes to surrounding habitats could influence the trends of bird populations on a given plot. However, changes to surrounding habitats are seldom described for the individual plots (Breeding Bird Census, 1999).

BBC standards require that vegetation data be recorded to ensure that the habitat of the plot is characterized. There are numerous ways to conduct a vegetation study. The BBC has adopted a method based on recommendations by James and Shugart (James, 1978). They suggested that if compilers of Breeding Bird Censuses and Winter-Bird Populations Studies would adopt this method, the censuses could be compared in various ways (James, 1978). The method involves locating randomly distributed circular plots

and surveying and recording descriptions of the trees in that spot. The method is useful because it estimates the amount of woody vegetation present for each species of tree or each size class of trees.

Ideally, BBCs should be conducted yearly. Therefore, it is important that a standard method be used in data collection. The method used in collecting vegetation analysis includes counting the number of individual species and the basal area of each tree species (McDonald, 1997). The percentage of canopy and ground cover are to be calculated. The vegetation study is crucial in defining breeding bird species habitat and the effects of shelterwood-cutting on bird populations.

In order to precisely document the bird activity on shelterwood-cut stands, it is necessary to set up a BBC plot. The first year of establishing and setting up a BBC plot is the most difficult. The measuring, mapping, and marking of census lines should be done well in advance of the breeding season. The perimeters of the plot should be accurately determined and markers should be placed to insure the plot maps are drawn to scale. Once the markers are in place and the plot maps precisely drawn, data collection can begin. Placing the plot markers should be done during the winter when the understory foliage has died back for the season.

The study area should be restricted to a single uniform environmental type (Hall, 1964). A topographic map may prove helpful in locating the best vicinity for the census. The edge of the plot ideally will be well within a much larger area of the same habitat. Distinct changes in habitat along the plot edges (edge effect) may attract bird species different from those associated with the plot's main habitat. It may not be possible to avoid edge effect, but an effort should be made to reduce it as much as possible.

The size and edge requirements of the BBC methodologies can present difficulty in establishing BBC plots. It may be difficult to locate 10 hectares of a single uniform environmental type that can be marked and used as census plot. This factor may also account for the lack of interest in observers to conduct BBC's. Fortunately, the VDGIF and VDF had two 20 hectare plots for this study. The plots chosen for the BBC are portions of the Appomattox-Buckingam State Forest, owned by the VDF.

These plots were chosen because the boundaries of the land meet most of the criteria for conducting a BBC. The Kyanite plots do not meet the requirements of the BBC for edge effect. Loth One and Two have identical boundaries and adjacent habitats. The boundaries consist of secondary growth mixed-hardwood forest, except for the end of Row One and Row Two on Loth One, which consist of a pine plantation. Kyanite One and Two are also surrounded by secondary growth mixed-hardwood forest, except for an agricultural field at the end of Row One and Row Two on Kyanite Two.

The four plots are located about 23 miles northwest of Farmville, Virginia, West of U.S. Route 15. Loth One and Two are located off of Loth Forest Road, which is off of State Route 640. Kyanite One and Two are located off of state Route 609. Kyanite One and Two was shelterwood-cut in April 1998. Loth One and Two had 38 acres shelterwood-cut in January 1997 and 12 acres cut in January 1998. All plots were cut by loggers under contract with the state department of forestry.

Baseline data was collected on two paired shelterwood-cut oak stands in Buckingham County Virginia. The impact of current forestry management practices in the piedmont of Virginia on the area's breeding bird populations was the focus of this

study. This study identified species and densities of breeding birds that utilized two-paired shelterwood-cut oak stands.

Methods

To determine the breeding bird densities on the four shelter-wood plots the Breeding Bird Census method was used. Standard techniques for establishing and surveying BBC plots were followed in this study (USGS, 1999). Careful attention was given to establishing a site, characterizing habitat, and to the census methodology. It is imperative that observers know their own location while conducting a census so that the location of the bird can be accurately recorded. The 10 hectare plot must have field markers at regular intervals. This enables the observer to know his own as well as the bird's location on the plot. A surveying compass and measuring tape were used to establish a straight transect that could be followed by the observer easily.

The boundaries of the plots were established first. The borders were marked for each plot. The first transect was placed at least 10 meters from the edge of the boundary. Thus, at least a ten meter buffer zone was used. Re-bar stakes that are three feet in length were used as field markers. Sheet tin was cut 4 X 2 inches and painted with fluorescent orange paint. Two holes were drilled in the sheet tin so that wire could be used to attach the sheet tin to the re-bar. The sheet tin and re-bar served as a practical and easily seen field marker. Once the first field marker on the transect was placed, another field marker was placed parallel to the first, 20 meters away. Thus, field markers were continuously placed every 20 meters following a line parallel to one border of the plot. For example, Loth one and two were bordered by Loth Forest Road, the road was used as a guideline when setting up the first stake of each row on both plots. The first stake on each row was placed 10 meters in from Loth Forest Road. The second stake of each row was then placed 20 meters from stake one at 75 degrees east north east. A compass was used to

ensure the transect lines continued at 75 degrees. The transect lines could be followed from stake to stake following the 75 degree line. Occasional pieces of flagging were tied to vegetation along the transect line. This aided in the location of the next stake while walking the plots. See plot maps in Appendix I for locations of transect lines and stakes on all four plots.

After the first row on each plot was established a second row was staked. The second row runs parallel to the first row and was placed 50 meters from the first row. The second row and all other rows established on the plots were marked with re-bar and flagged. The process of establishing transect lines was repeated until 100 stakes of re-bar were in place. The ideal plot would have five rows of 20 stakes each. This equals 100 re-bar stakes and assures that 10 hectares of land are covered. Kyanite one has five rows with 20 stakes in each row; however, the other plots have varied transect rows and lengths due to the dimensions of the plot.

Once the plots were staked, maps were constructed. The maps have dots representing each field marker and the number of rows on a plot. The maps were drawn to scale having one inch equal 50 meters and one centimeter equal 20 meters. Along with the scale, the degree for each transect line is noted on the map. The maps have a place for the observer, date, start time, start temperature, sky and wind conditions, end time, and end temperature to be recorded.

Each time the plot was visited a copy of the map accompanied the observer. The observer recorded the date, temperature, time, and weather conditions on the map. Temperature was recorded in the same location on each individual trip. Censuses were

conducted from 23 May 1999 to 2 July 1999, falling within the breeding season of the birds on the plots (Appendix V).

All visits to the plots were conducted in the morning. The Cornell Laboratory of Ornithology recommends that visits be made either in the early morning or late afternoon or early evening, when singing activity is greatest (Cornell University). Visits should be long enough to maximize detection of all breeding bird species. General guidelines for time spent on one visit are ten-twelve min/ha in forested habitats and four-five min/ha in open habitats (USGS, 1999). The visits to the plots were done at a slow, steady walking pace, except when the observer stopped to record data or look at a bird.

Censuses were not conducted during heavy rains or high winds because these conditions severely reduce bird activity (USGS, 1999). The Beaufort Wind Scale was used to determine if the winds were too high, for example counts were not conducted if the Beaufort Wind Scale was above three (Appendix V). The Beaufort Wind Scale estimates wind speed by observing the wind effect of the landscape. For example, a two on the Beaufort Wind Scale indicates that leaves rustle, wind is felt on face or a weather vane begins to move. This scale is effective for bird observation reports because it allows for wind conditions to be considered when analyzing data.

A minimum of eight visits to the BBC plots should be conducted during the breeding bird season (USGS, 1999). Conducting the census eight times allows the opportunity for all breeding birds to be recorded and reduces bias. All four plots in this study were visited nine times. Each field sheet has the dates that the plots were visited. All censuses were performed by Sally Statham or Patrick Collins. Each observer used binoculars and a clip board with the map of the plot during each census. The observer

marked the starting point on the map at the beginning of each visit. These starting points were different from census to census to reduce bias. For example, if the observer started at the same location each census, by the time they got to the end of the plot some birds may have already stopped singing. Starting the census at different locations allows an opportunity for all breeding birds to be recorded. The observer did not stop to observe bird nests or behavior unless the behavior was clearly associated with breeding.

Symbols were used to identify bird species on the map. Hall (1964) recommended that the observer use a single letter or a brief abbreviation to represent each species (McDonald, 1997). This study used the first two letters of the birds common name. For example, a Carolina Wren was recorded as CaWr, a Tufted Titmouse was recorded as TuTi, and so forth. When a bird was flying or changing locations a line was drawn on the map to indicate that the same bird relocated and sang at another location. Simultaneous observations of two individuals of the same species singing or seen were recorded so that birds could be separated from their neighbors after they have moved (McDonald, 1997). This was indicated using numbers. For example, if two Carolina Wrens were singing at the same time, they were both recorded on the map sheet and numbered.

After all nine censuses were conducted on the four plots, an individual species map was made for any species found on the BBC plot. This individual map is necessary to determine actual territory numbers. A list of all of the species and how often they occurred on each plot during the censuses was compiled and used when making individual territory maps. The species maps were made by compiling every mark indicating a registration of a particular species from all visits onto a single map. For example, if a Carolina Wren was registered on plot Loth One, then a map was made for Loth

One/Carolina Wren. Each registration of a Carolina Wren was precisely transferred onto the Loth One/Carolina Wren map in the same location. This allowed analysis of individual bird species on each plot. Clusters of more than three registrations were considered a territory for that species. Some territory maps were difficult to determine. For example, the Indigo Bunting had numerous registrations and the clusters of registrations overlapped. Personal judgment was used in determining territories were registration clusters were numerous. It is impossible to be certain of breeding bird territories without color banding and visual sightings.

Vegetation surveys were conducted after the breeding bird census data were collected. The James and Shugart (1970) methods, with slight variations, were used in collecting vegetation data (James, 1964). Percent relative density, percent relative dominance, percent relative frequency, percent relative frequency of shrubs, class size distribution, percent shrub cover, percent ground cover, and percent canopy cover was recorded at each study location. The data were collected using two meter sticks, a fifty meter tape, and an ocular tube. Ten random areas were selected on each BBC plot to be the centers of the ten vegetation sample areas. The random locations were located at a field marker. The field markers to be sampled were randomly selected while walking through each plot. Once a stake was selected an 11.28-meter radius (0.10 acre) circle was marked off using the stake as the center of the circle. All data recorded were within the radius of the circle. A vegetation data sheet was used at each individual survey. Therefore, ten data sheets were used for each plot. The vegetation data sheet is located in Appendix 4. The diameter of the trees inside the circle was recorded first. All trees that had a diameter of over seven centimeters were recorded. The measurement was taken at

breast height. This is a standard method used and is known as diameter at breast height (DBH) or 4.5 feet above ground. Next, two transects were established using a compass. The two transects started at the stake and ran north/south and east/west. The observer then walked each transect holding two meter sticks at breast height and called out all tree and shrub species the meter sticks hit, while another observer recorded. The number of each tree and shrub species hit in the circle was recorded and counted on the vegetation data sheet.

The same transect lines were used to determine the canopy and ground cover within the circle. An ocular tube was used to measure the canopy and ground cover. An observer walked along the transects and stopped at 10 random points per transect (twenty times per circle) to record data. A hit "+" or a miss "-" was recorded to indicate whether green canopy (hit or miss) was visible behind the cross-hairs of the ocular tube. The same procedure was done to record ground cover. The observer walked the transect lines and stopped at 10 random points per line. The observer then used the ocular tube to record vegetation.

The data collected were analyzed and put on summary sheets. Percent averages were calculated for all four plots: percent relative density, percent relative dominance, percent relative frequency, percent relative frequency of shrubs, class size distribution, percent shrub cover, percent ground cover, and percent canopy cover. Formulas used to determine these percents are located in Appendix IV.

Abbreviations Used for Bird Registrations

Common Name	Abbreviation
Northern Bobwhite	NoBw
Mourning Dove	MoDo
Yellow-billled Cuckoo	YbCu
Whip-poor-will	Whip
Red-bellied Woodpecker	RbWp
Downy Woodpecker	DoWp
Hairy Woodpecker	HaWp
Northern Flicker	NoFl
Pileated Woodpecker	PiWp
Eastern Wood-pewee	EwPe
Eastern Phoebe	EaPh
Great-crested Flycatcher	GCFl
Blue Jay	Jay
American Crow	Crow
Carolina Chickadee	CaCh
Tufted Titmouse	Tuti
White-breasted Nuthatch	WBNu
Carolina Wren	CaWr
Blue-gray Gnatcatcher	BgGn
Wood Thrush	WoTh
Yellow-throated Vireo	YtVi
Red-Eyed Vireo	ReVi
Prairie Warbler	PrWa
Ovenbird	Oven
Common Yellowthroat	CoYe
Hooded Warbler	HoWa
Yellow-breasted Chat	YeCh
Summer Tanager	SuTa
Scarlet Tanager	ScTa
Northern Cardinal	NoCa
Indigo Bunting	InBu
Rufous-sided Towhee	RsTo
Chipping Sparrow	ChSp
Field Sparrow	FiSp
Brown-headed Cowbird	BHCB

Results

A total of 35 different bird species were identified and registered on all four plots (Tables 1,2). Not all of the birds seen on the plots established territories on the plots. Eight species established territories on all four plots. These species were: Blue-gray Gnatcatcher (*Polioptila caerulea*), Carolina Wren (*Thryothorus ludovicianus*), Eastern Wood-pewee (*Contopus virens*) , Indigo Bunting (*Passerina cyanea*), Red-Eyed Vireo (*Vireo olivaceous*), Rufous-sided Towhee (*Piplio erythrophthalmus*), Scarlet Tanager (*Piranga olivacea*), Summer Tanager (*Piranga rubra*), and Carolina Chickadee (*Parus carolinensis*), and Brown-headed Cowbird (*Molothrus ater*).

A primary objective of this study was to determine the number of breeding bird territories on the BBC plot (Tables 3,4). Out of all of the study plots Loth Two had the highest number of breeding bird territories. There were 18 territories found on Loth Two, 17 territories on Loth One, 16 territories on Kyanite Two, and 12 territories on Kyanite One (Table 5).

Five species were found to have territories on three of the plots: Blue Jay (*Cyanocitta cristata*), Common Yellowthroat (*Geothylpis trichas*), Great-crested Flycatcher (*Empidonax virescens*), and White-breasted Nuthatch (*Sitta carolinensis*).

Five species had territories on two of the plots: Downy Woodpecker (*Picoides pubescens*), Hooded Warbler (*Wilsonia citrina*), Prairie Warbler (*Dendroica discolor*), Red-bellied Woodpecker (*Melanerpes carolinus*), Tufted Titmouse (*Parus bicolor*).

The American Crow (*Corvus brachyrhynchos*), Field Sparrow (*Spizella pusilla*), Yellow-billed Cuckoo (*Coccyzus americanus*), Yellow-breasted Chat (*Icteria virens*), Whip-poor-will (*Phalaenoptilus nuttallii*), Eastern Phoebe (*Sayornis phoebe*), and Red-

Table 1. Total Registrations of Breeding Birds on Kyanite 1 and 2

Species	Scientific Name	Kyanite 1	Kyanite 2
Northern Bobwhite	*Colinus virginianus*	0	1
Mourning Dove	*Zenaida macroura*	0	4
Yellow-billed Cuckoo	*Coccyzus americanus*	2	2
Red-bellied Woodpecker	*Melanerpes carolinus*	3	7
Downy Woodpecker	*Picoides pubescens*	2	7
Hairy Woodpecker	*Picoides villosus*	0	1
Northern Flicker	*Colaptes auratus*	0	2
Pileated Woodpecker	*Dryocopus pileatus*	4	1
Eastern Wood-pewee	*Contopus virens*	49	54
Great-crested Flycatcher	*Myiarchus crinitus*	7	8
Blue Jay	*Cyanocitta cristata*	15	31
American Crow	*Corvus brachyrhynchos*	0	9
Carolina Chickadee	*Parus carolinensis*	7	26
Tufted Titmouse	*Parus bicolor*	10	8
White-breasted Nuthatch	*Sitta carolinensis*	6	13
Carolina Wren	*Thryothorus ludovicianus*	59	45
Blue-gray Gnatcatcher	*Polioptila caerulea*	18	18
Wood Thrush	*Hylocichla mustelina*	1	2
Red-Eyed Vireo	*Vireo olivaceous*	71	93
Prarie Warbler	*Dendroica discolor*	0	3
Common Yellowthroat	*Geothylpis trichas*	3	12
Hooded Warbler	*Wilsonia citrina*	0	2
Summer Tanager	*Piranga rubra*	17	18
Scarlet Tanager	*Piranga olivacea*	7	11
Northern Cardinal	*Cardinalis cardinalis*	5	7
Indigo Bunting	*Passerina cyanea*	83	95
Rufous-sided Towhee	*Piplio erythrophthalmus*	33	35
Chipping Sparrow	*Spizella passerina*	0	1
Brown-headed Cowbird	*Molothrus ater*	13	47

Table 2. Total Registrations of Breeding Birds on Loth 1 and 2

Species	Scientific Name	Loth 1	Loth 2
Northern Bobwhite	*Colinus virginianus*	1	10
Mourning Dove	*Zenaida macroura*	2	7
Yellow-billed Cuckoo	*Coccyzus americanus*	3	1
Whip-poor-will	*Phalaenoptilus nuttallii*	2	0
Red-bellied Woodpecker	*Melanerpes carolinus*	11	13
Downy Woodpecker	*Picoides pubescens*	3	6
Hairy Woodpecker	*Picoides villosus*	1	0
Northern Flicker	*Colaptes auratus*	1	1
Pileated Woodpecker	*Dryocopus pileatus*	0	1
Eastern Wood-pewee	*Contopus virens*	22	58
Eastern Phoebe	*Sayornis phoebe*	1	0
Great-crested Flycatcher	*Myiarchus crinitus*	19	6
Blue Jay	*Cyanocitta cristata*	5	8
American Crow	*Corvus brachyrhynchos*	13	6
Carolina Chickadee	*Parus carolinensis*	17	13
Tufted Titmouse	*Parus bicolor*	35	44
White-breasted Nuthatch	*Sitta carolinensis*	15	4
Carolina Wren	*Thryothorus ludovicianus*	40	41
Blue-gray Gnatcatcher	*Polioptila caerulea*	46	50
Wood Thrush	*Hylocichla mustelina*	1	0
Yellow-throated Vireo	*Vireo flavifrons*	1	0
Red-Eyed Vireo	*Vireo olivaceous*	49	53
Prarie Warbler	*Dendroica discolor*	56	85
Ovenbird	*Seiurus aurocappilus*	0	5
Common Yellowthroat	*Geothylpis trichas*	1	9
Hooded Warbler	*Wilsonia citrina*	10	22
Yellow-breasted Chat	*Icteria virens*	0	23
Summer Tanager	*Piranga rubra*	10	16
Scarlet Tanager	*Piranga olivacea*	26	15
Northern Cardinal	*Cardinalis cardinalis*	0	3
Indigo Bunting	*Passerina cyanea*	59	41
Rufous-sided Towhee	*Piplio erythrophthalmus*	78	73
Chipping Sparrow	*Spizella passerina*	1	1
Field Sparrow	*Spizella pusilla*	5	3
Brown-headed Cowbird	*Molothrus ater*	29	45

Table 3. Breeding Bird Territories on the Loth Forest Plots

Species	Scientific Name	Loth 1	Loth 2
Yellow-billed Cuckoo	*Coccyzus americanus*	1	0
Whip-poor-will	*Phalaenoptilus nuttallii*	1	0
Red-bellied Woodpecker	*Melanerpes carolinus*	0	1
Downy Woodpecker	*Picoides pubescens*	0	1
Eastern Wood-pewee	*Contopus virens*	4	9
Great-crested Flycatcher	*Myiarchus crinitus*	2	0
Blue Jay	*Cyanocitta cristata*	0	1
American Crow	*Corvus brachyrhynchos*	0	1
Carolina Chickadee	*Parus carolinensis*	3	2
Tufted Titmouse	*Parus bicolor*	3	6
White-breasted Nuthatch	*Sitta carolinensis*	4	0
Carolina Wren	*Thryothorus ludovicianus*	4	5
Blue-gray Gnatcatcher	*Polioptila caerulea*	6	8
Red-Eyed Vireo	*Vireo olivaceous*	6	7
Prarie Warbler	*Dendroica discolor*	6	15
Common Yellowthroat	*Geothylpis trichas*	0	1
Hooded Warbler	*Wilsonia citrina*	1	2.5
Yellow-breasted Chat	*Icteria virens*	0	3
Summer Tanager	*Piranga rubra*	3	3
Scarlet Tanager	*Piranga olivacea*	3	4
Indigo Bunting	*Passerina cyanea*	8	7
Rufous-sided Towhee	*Piplio erythrophthalmus*	7	8
Field Sparrow	*Spizella pusilla*	1	0

Table 4. Summary of Breeding Bird Territories on the Kyanite Plots

Species	Scientific Name	Kyanite 1	Kyanite 2
Red-headed Woodpecker	*Melanerpes erythrocephalus*	0	1
Red-bellied Woodpecker	*Melanerpes carolinus*	0	1
Downy Woodpecker	*Picoides pubescens*	0	1
Eastern Wood-pewee	*Contopus virens*	8	9
Great-crested Flycatcher	*Myiarchus crinitus*	1	1
Blue Jay	*Cyanocitta cristata*	1	3
Carolina Chickadee	*Parus carolinensis*	2	5
White-breasted Nuthatch	*Sitta carolinensis*	1	2
Carolina Wren	*Thryothorus ludovicianus*	4	7
Blue-gray Gnatcatcher	*Polioptila caerulea*	3	2
Red-Eyed Vireo	*Vireo olivaceous*	6	5
Common Yellowthroat	*Geothylpis trichas*	1	1
Summer Tanager	*Piranga rubra*	1	3
Scarlet Tanager	*Piranga olivacea*	1	1
Indigo Bunting	*Passerina cyanea*	7	8
Rufous-sided Towhee	*Piplio erythrophthalmus*	3	4

Table 5. Species Territories on Loth and Kyanite Plots

Species found on all four plots
Blue-grey Gnatcatcher
Carolina Wren
Eastern Wood-pewee
Indigo Bunting
Red-eyed Vireo
Rufous-sided Towhee
Scarlet Tanager
Summer Tanager
Species found on three plots
Blue Jay
Carolina Chickadee
Common Yellowthroat
Great Crested Flycatcher
White Breasted Nuthatch
Species found on two plots
Downy Woodpecker
Hooded Warbler
Prairie Warbler
Red-bellied Woodpecker
Tufted Titmouse
Species found on one plot
American Crow
Field Sparrow
Yellow-billed Cuckoo
Whip-poor-will
Red Headed Woodpecker

headed Woodpecker (*Melanerpes erythrocephalus*) were found to have territories only on one plot.

The results of the vegetation study indicated that all four plots were dominated by White Oak (*Quercus alba*) and Chestnut Oak (*Quercus montana*). White Oak was found to have the highest percentage relative dominance on Kyanite Two and Loth One while Chestnut Oak had the highest percentage relative dominance on Kyanite One and Loth Two. Table 6, shows the class size distributions of all species of trees found on all four plots. Most of the larger trees measured were White Oak, Chestnut Oak, Scarlet Oak (*Quercus coccinea*), and Red Oak (*Quercus rubra*). The percent relative dominance and class size distributions of the plots are of particular interest because the habitats of the BBC plots can be compared. The relative dominance and density, frequency of shrubs and trees, and vegetation coverage can be found in Tables 7-11.

Table 6. Tree Size Distribution For Both Kyanite and Loth Plots

			Kyanite 1					
Species	3-6 cm	6-9 cm	9-15 cm	15-21 c	21-27 c	27-33 c	33-40 c	40+ cm
White Oak	0	1	0	0	1	0	1	2
Chestnut Oak	0	1	3	0	0	1	2	9
Scarlet Oak	0	0	0	0	0	0	0	1
Red Oak	0	1	0	0	0	0	0	0
Pignut Hickory	0	0	0	0	0	1	0	1
Red Cedar	0	0	0	0	0	1	0	0
Sourwood	0	1	0	0	0	0	0	0
			Kyanite 2					
Species	3-6 cm	6-9 cm	9-15 cm	15-21 c	21-27 c	27-33 c	33-40 c	40+ cm
White Oak	0	0	0	0	0	0	1	7
Chestnut Oak	0	0	0	0	0	0	0	2
Scarlet Oak	0	0	0	0	0	0	0	1
Red Oak	0	0	0	0	0	1	1	3
Sour Gum	0	2	0	0	0	0	0	0
American Beech	0	1	0	0	0	0	0	1
Red Maple	0	0	0	0	0	0	0	1
Sourwood	0	0	2	0	0	0	0	0
			Loth 1					
Species	3-6 cm	6-9 cm	9-15 cm	15-21 c	21-27 c	27-33 c	33-40 c	40+ cm
White Oak	0	0	1	0	0	0	1	7
Chestnut Oak	0	0	1	0	0	0	1	4
Red Oak	0	0	1	0	0	0	0	0
Black Oak	0	1	0	0	0	0	0	0
Sour Gum	0	0	1	0	0	0	0	0
Red Maple	0	6	0	0	1	0	1	0
Tulip Poplar	0	1	2	0	0	0	0	0
			Loth 2					
Species	3-6 cm	6-9 cm	9-15 cm	15-21 c	21-27 c	27-33 c	33-40 c	40+ cm
White Oak	0	1	1	1	0	0	2	4
Chestnut Oak	0	1	2	3	0	0	1	7
Red Maple	0	3	4	1	1	0	0	2
Sour Gum	0	0	1	0	0	0	0	0
Pignut Hickory	0	0	0	1	0	0	0	0

Table 7. The Percent Relative Frequency of Shurbs on the Kyanite and Loth Plots

Species	Kyanite 1	Kyanite 2	Loth 1	Loth 2
White Oak	20	0	40	80
Red Oak	10	10	60	40
Chestnut Oak	40	10	80	90
Black Oak	0	0	30	10
Sour Gum	60	50	100	100
Pignut Hickory	40	30	20	20
Mockernut Hickory	0	0	40	0
Ironwood	0	20	10	10
American Beech	0	0	30	60
Sourwood	60	50	20	0
Red Maple	60	90	100	100
Tulip Poplar	40	80	30	50
Dogwood	20	20	30	10
Chinkapin	0	10	0	0
White Ash	10	20	0	0
Cherry	10	0	0	10
Winged Sumac	0	10	0	0
Smooth Sumac	10	20	10	0
Redbud	30	10	0	0
Virginia Pine	10	0	10	20
Sassafras	10	0	0	0
Elm	10	0	0	0
Highbush Blueberry	0	10	0	0
American Holly	0	0	0	10
Mountain Laurel	0	0	0	30

Table 8. The Percent Relative Frequency of Trees on the Kyanite and Loth Plots

Species	Kyanite 1	Kyanite 2	Loth 1	Loth 2
White Oak	50	50	70	60
Red Oak	10	30	10	0
Chestnut Oak	50	10	50	70
Scarlet Oak	10	10	0	0
Black Oak	0	0	10	0
Red Maple	0	10	50	80
Red Cedar	10	0	0	0
Sour Gum	0	20	10	10
American Beech	0	20	0	0
Sourwood	10	10	0	0
Pignut Hickory	20	0	0	10

Table 9. The Percent Relative Dominance of Trees on the Kyanite and Loth Plots

Species	Kyanite 1	Kyanite 2	Loth 1	Loth 2
White Oak	21.8	34.4	57.2	40.1
Red Oak	0.1	20.4	0.3	0
Chestnut Oak	59.6	27.9	33.8	44.3
Scarlet Oak	9	7.4	0	0
Black Oak	0	0	0.1	0
Red Maple	0	3.4	6.6	14.5
Red Cedar	1.7	0	0	0
Pignut Hickory	7.3	0	0	0.6
American Beech	0	5.8	0	0
Sourwood	0.1	0.3	0	0
Sour Gum	0	0.2	0.6	0.2
Tulip Poplar	0	0	1.1	0

Table 10. The Percent Relative Density of Trees on the Kyanite and Loth Plots

Species	Kyanite 1	Kyanite 2	Loth 1	Loth 2
White Oak	18.5	34.7	31	25
Chestnut Oak	59.2	8.6	20.6	38.8
Red Oak	3.7	21.7	3.4	0
Scarlet Oak	3.7	4.3	0	0
Black Oak	0	0	3.4	0
Sour Gum	0	8.6	3.4	2.7
Red Cedar	3.7	0	0	0
Ironwood	3.7	0	0	0
Pignut Hickory	7.4	0	0	2.7
American Beech	0	8.6	0	0
Sourwood	0	8.6	0	0
Sour Gum	0	8.6	3.4	2.7
Tulip Poplar	0	0	10.3	0
Red Maple	0	4.3	27.5	30.5

Table 11. The Amount of Ground, Canopy, and Shurb Coverage on the Kyanite and Loth Plots

	% Ground Cover	
Kyanite 1	**Kyanite 2**	**Loth 1**
71.5	54	46.5
	% Canopy Cover	
Kyanite 1	**Kyanite 2**	**Loth 1**
69.5	70	29
	Shrub Cover (Stems/Acre)	
Kyantie 1	**Kyantie 2**	**Loth 1**
915	975	2280

TREES AND SHURBS FOUND IN THE VEGETATION STUDY

Common Name	Scientific Name
White Oak	*Quercus alba*
Chestnut Oak	*Quercus montana*
Chinkapin Oak	*Quercus muhlenbergii*
Red Oak	*Quercus rubra*
Scarlet Oak	*Quercus coccinea*
Black Oak	*Quercus velutina*
Post Oak	*Quercus stellata*
Red Maple	*Acer rubrum*
Sour Gum	*Nyssa*
Pignut Hickory	*Carya glabra*
Mockernut Hickory	*Carya tomentosa*
Red Cedar	*Juniperus virginiana*
Ironwood	*Carpinus caroliniana*
American Beech	*Fagus grandifolia*
Sourwood	*Oxydendrum arboreum*
Tulip Poplar	*Liriodendron tulipifera*
Dogwood	*Cornus florida*
White Ash	*Fraxinus americana*
Cherry	*Prunus*
Winged Sumac	*Rhus copallina*
Smooth Sumac	*Rhus glabra*
Redbud	*Cercis canadensis*
Virginia Pine	*Pinus virginiana*
Loblolly Pine	*Pinus taeda*
Sassafras	*Sassafras albidum*
Elm	*Ulmus alata*
Highbush Blueberry	*Vaccinium corymbosum*
American Holly	*Ilex opaca*
Mountain Laurel	*Kalmia latifolia*

Discussion

This study was conducted in order to determine the effects of a shelterwood-cut oak stand on the breeding bird population. In order to do this, data must be collected over many years. This is the first year of study on Loth One, Loth Two, Kyanite One, and Kyanite Two; therefore all data collected in this study are baseline data. Baseline data collection includes the establishment of the BBC plots, the initial census of all plots, and a vegetation analysis. The results found from the baseline data will be used in the future to determine the long-term effects of shelterwood-cut oak management on the breeding bird population.

The Eastern Wood-Pewee had a high number of territories on all four plots. This species had eight territories on Kyanite One, nine territories on Kyanite Two, four territories on Loth One, and nine territories on Loth Two. The Eastern Wood- Pewee thrives in open woodlands, orchards, and shade trees (Bull and Farrand, 1996). All four plots were relatively open due to the recent shelterwood-cuts. This openness may provide increased foraging opportunities for this species, while still providing sufficient nest sites to attract the species (McDonald, 1997). The same may be true for the Blue-gray Gnatcatcher because it thrives in open woodlands (McDonald, 1997). This species had six territories on Loth One, eight territories on Loth Two, three territories on Kyanite One, and two territories on Kyanite Two. As the plot's understory layer increases there may be a decrease in the number of Eastern Wood-Pewees and Blue-gray Gnatcatchers. These findings might be true for other bird species that depend largely on insects as a source of food. Both the Eastern Wood-pewee and the Blue-gray Gnatcatcher are described as occupying forested habitats with a large source of insects (McDonald, 1997). Clawson

and Callahan (1996) found Eastern Wood-Pewees responding negatively to high shrub and tree density (McDonald, 1997). Which are expected to increase on the plots in subsequent years.

Loth One and Two had a greater amount of shrub layer than Kyanite One and Two. This difference in landscape can be compared with a difference in bird species found on the plots. For instance, the Prairie Warbler established six territories on Loth One and fifteen territories on Loth Two, but no territories on the Kyanite plots were established. Prairie Warblers breed in the shrubby layer of the forest. As the plots change there may also be a change in the bird species establishing territories on the plots.

Several of the bird species found on all four plots were Neotropical migrants (Bull, 1996). There have been recent efforts to ensure the conservation of Neotropical migrants (Terborgh, 1989). The Wood Thrush, a Neotropical migrant, was observed in a similar study. The study showed that the Wood Thrush was heard singing in nearby uncut hardwood forest areas, but never established a territory on the shelterwood-cut (McDonald, 1997). This same result was found in my study. The Wood Thrush was registered a total of three times throughout the study. However, the bird could be heard daily from nearby uncut hardwood forests. The Wood Thrush species thrives in thick understory areas with dense coverage (Bull and Farrand, 1996). This species may not have regularly occurred on the four plots because the canopy was not dense enough. As the four plots mature this may be a species that will eventually establish territories within the four plots.

Another Neotropical migrant found on all four plots is the Red-eyed Vireo. This bird established six territories on Kyanite One, five territories on Kyanite Two, six

territories on Loth One, and seven territories on Loth Two. This species is typically found in deciduous forest and shade trees and therefore it was not expected to be abundant on the cut forest plots. Apparently using the shelterwood cutting method allowed enough mature trees for this species to find shelter, nesting areas, and food. Other species such as tanagers, which are usually found in mature deciduous forests, were also found on the four plots. Both the Summer and Scarlet Tanager defended territories on all four plots.

Another group of Neotropical migrants is the warblers. Warblers are found in all types of woodlands but most are found in mature deciduous forests (Bull, 1996). McDonald's (1997) study found a variety of warblers; however this study found very few. The Common Yellowthroat and Hooded Warbler were the only warblers that defended territories on the BBC plots. Both species are found in relatively open woodlands and would therefore be expected on the shelterwood-cut plots. Once again, as the plots mature there may be other forest dwelling warblers that will defend territories on the plots.

One species that was very successful at defending territories on all four plots was the Indigo Bunting. This species is usually found on abandoned farmland, old pastures, woodland clearings, and forest edges adjacent to fields (Bull and Farrand, 1996). A total of thirty territories were established within all four plots. It was to be expected that many Indigo Buntings would be found on the shelterwood-cut plots. Annand and Thompson (1997) found that Indigo Buntings are commonly found on clear-cut stands. The four plots were not clear-cut stands, however the edges of the plots did not have as much vegetation as the center of the plots. Most of the Indigo Buntings had territories that were located toward the edge of the plots.

When conducting the BBC, the edges of the plots have a significant role. As mentioned before, it is important to select a plot where the edge-effect will be minimized. The edge of Loth One has a pine plantation. These pines are located at the end of Rows One, Two, and Three. There was a Pine Warbler that was frequently heard singing from these pines but it did not enter the plot. Wood Thrushes were registered on three of the plots, however none of them defended territories on any of the plots. This species was heard daily from neighboring woodlands and occasionally visited the plots. This species habitat consists of moist, deciduous woodlands with a thick understory (Bull and Farrand, 1996). Adjacent to both Kyanite plots and Loth One are woodlands with a thick understory. It is important that the observer have precise listening skills. This will ensure that birds singing on the edge of a plot are not confused with birds singing on the plots.

As mentioned in McDonald's (1997) study, Brown-headed Cowbirds should be monitored to determine if this treatment invites nest parasitism at a rate higher than in uncut woodlands nearby. In this study Brown-headed Cowbirds were closely monitored and recorded. The Brown-headed Cowbirds' effect on the population declines of Neotropical migrants have been discussed and studied (McDonald, 1997). In this study, there were no Brown-headed Cowbird territories found on any of the four plots, but there were 134 registrations of this species. The reason for large registrations of Brown-headed Cowbirds on clear-cut and shelterwood cut plots may be due to the high number of breeding birds on the plots. The lack of understory on the plots may also attract the Brown-headed Cowbird because it may be easier to locate the other breeding bird species' nests. This baseline data on Brown-headed Cowbirds will be useful in investigating whether shelterwood cut stands invite this type of nest parasitism.

Future BBC data collected from these same four plots will allow a better comparison of how shelterwood-cut management practices and prescribed burns affect breeding birds. There may be an increase in forest dwelling bird species due to the understory growth. The understory will provide food and shelter for many other types of breeding birds. As the understory develops there may be loss of some bird species that thrive in an open habitat. This study shows that the shelterwood-cut does provide canopy to shelter some bird species.

Results of this study will be used in the future to compare with other BBC results in similar habitats. Such comparisons would have been useful while analyzing this data. This comparison was impossible due to the lack of BBC studies. More studies have been conducted on the comparison of clear-cutting and breeding bird populations. Yahner (1993) examined the effects of clear-cutting on wintering and breeding bird communities at the Barrens Grouse Habitat Management Area in Pennsylvania. The plots selected for the study were randomly selected and randomly visited. He concluded that clear-cutting of small stands did not have a detrimental long-term effect on most species of the wintering and breeding birds (Yahner, 1993).

Another study conducted by Annand (1997) focused on the effect of clear-cutting and breeding bird populations using the point-count method. The study was conducted predominantly forested landscape, in southeastern Missouri (Annand, 1997). The study concluded that Brown-headed Cowbirds were greater in clear-cut areas than in other non clear-cut areas (Annand, 1997). There has been an a greater interest in conducting studies comparing the success of breeding birds on clear-cut stands than on shelterwood-cut stands. The BBC method has been rarely used in the studies. Only two BBC studies were

reported for the entire state of Virginia in recent years and neither of them were conducted on shelterwood-cut stands. This study has gathered unique and interesting baseline data that can be used in the future in determining how shelterwood-cuts and prescribed burning impact breeding birds.

The intention of those involved in this project is to eventually have eight 10 hectare plots for BBC studies (McDonald, 1997). This year's study allowed for four new plots to be established, thus having a total of six BBC plots in Buckingham County, Virginia. If two more BBC plots are established the long term goal of this project will be met and a better understanding of the effects of shelterwood-cut stands on breeding birds of the Virginia Piedmont will be possible.

Figure 1
Comparison of Oaks on Plots

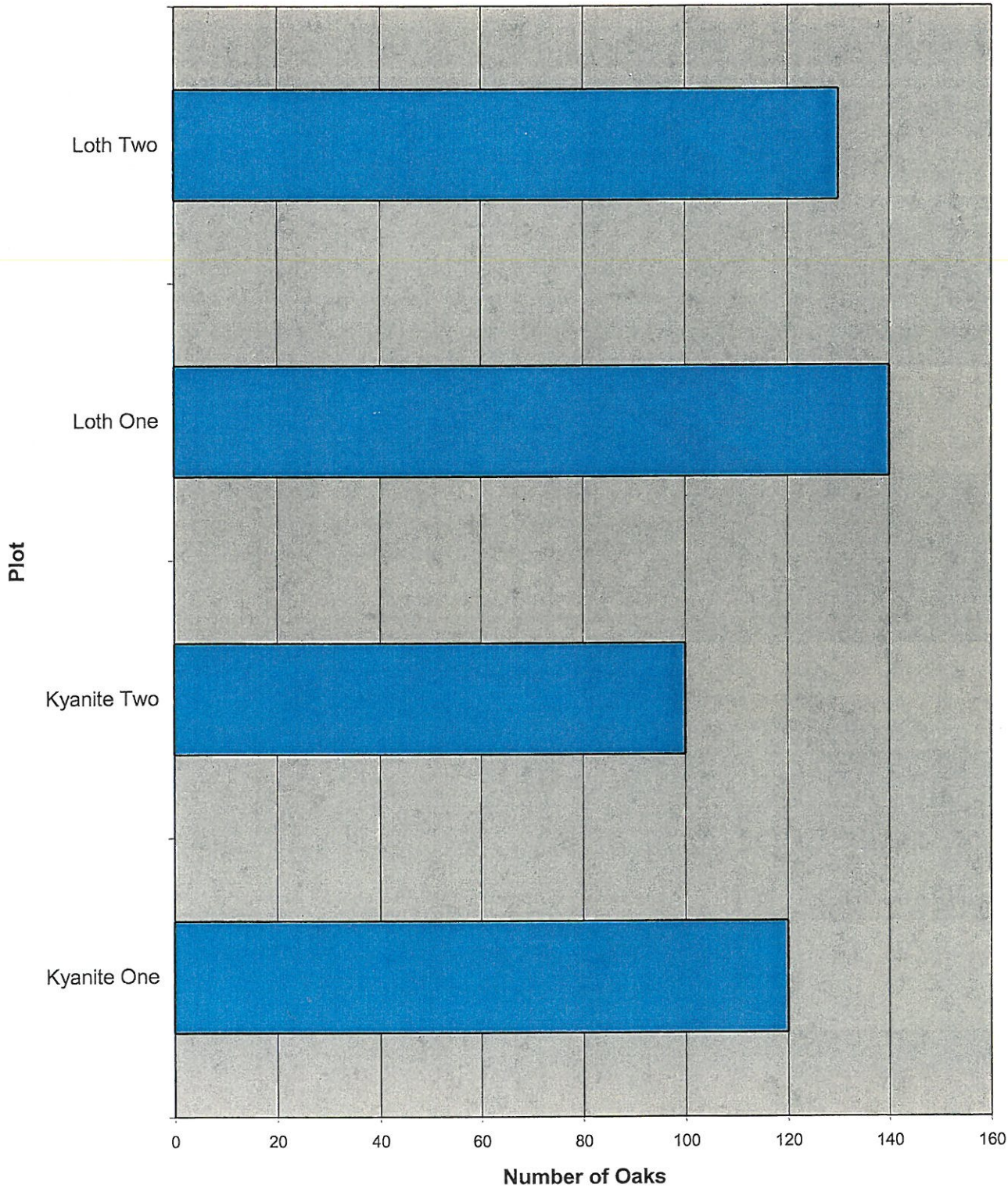
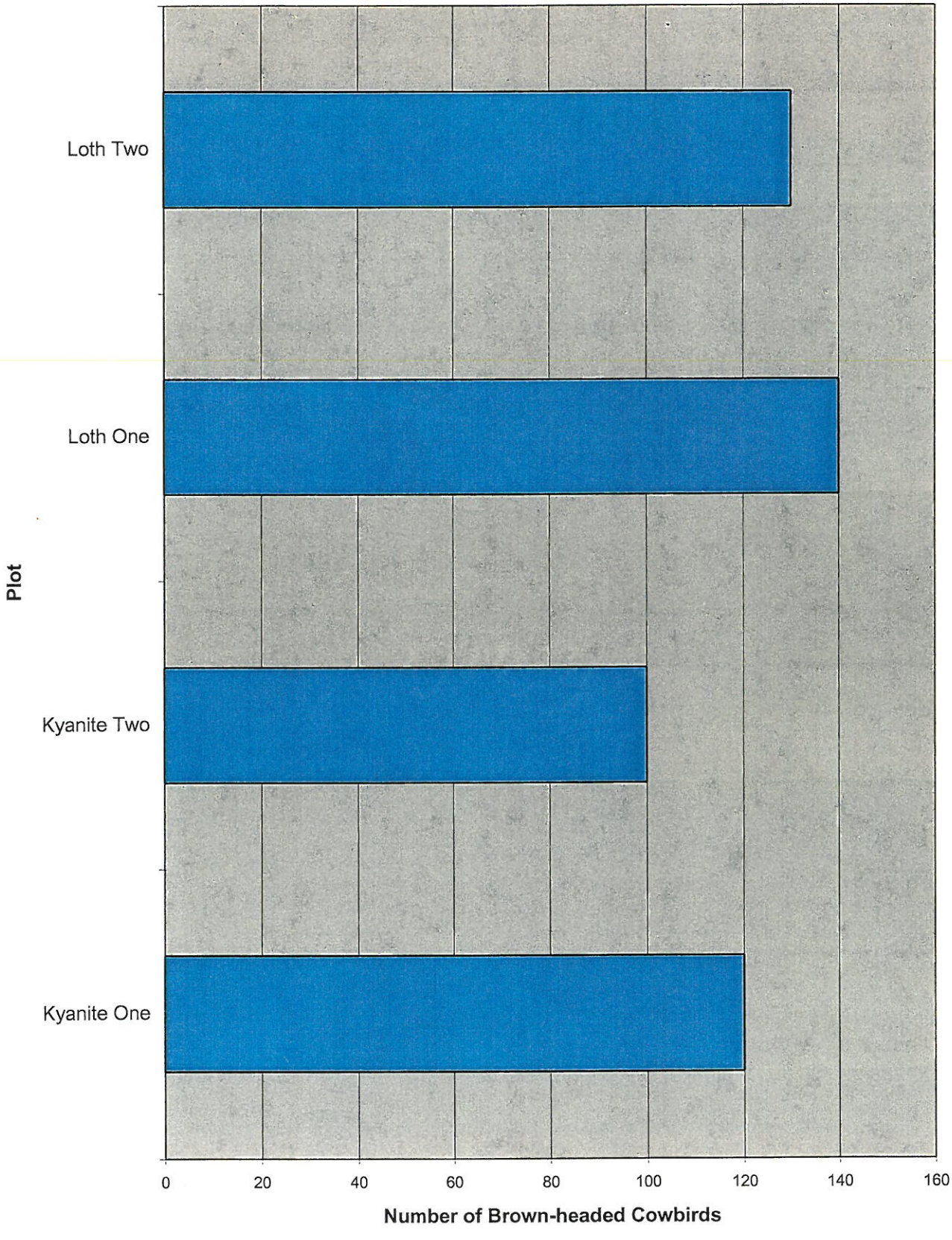


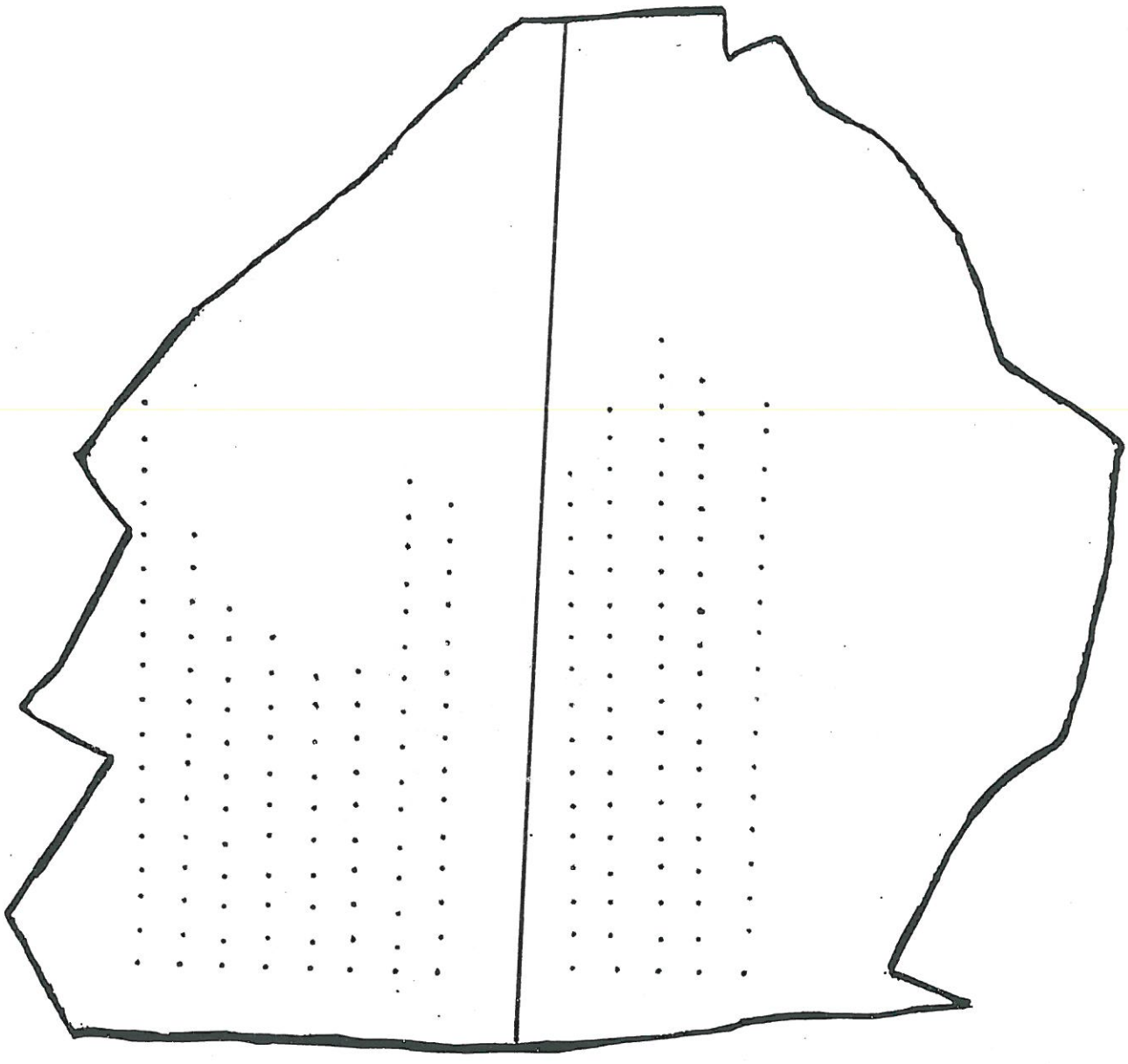
Figure 2
Comparison of Brown-headed Cowbirds on Plots



Appendix I

This appendix contains maps of the two-paired plots. Each map shows the plots location and degree at which the plot was set up.

Loth One & Loth Two

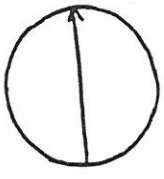


Loth Forest Road

Scale

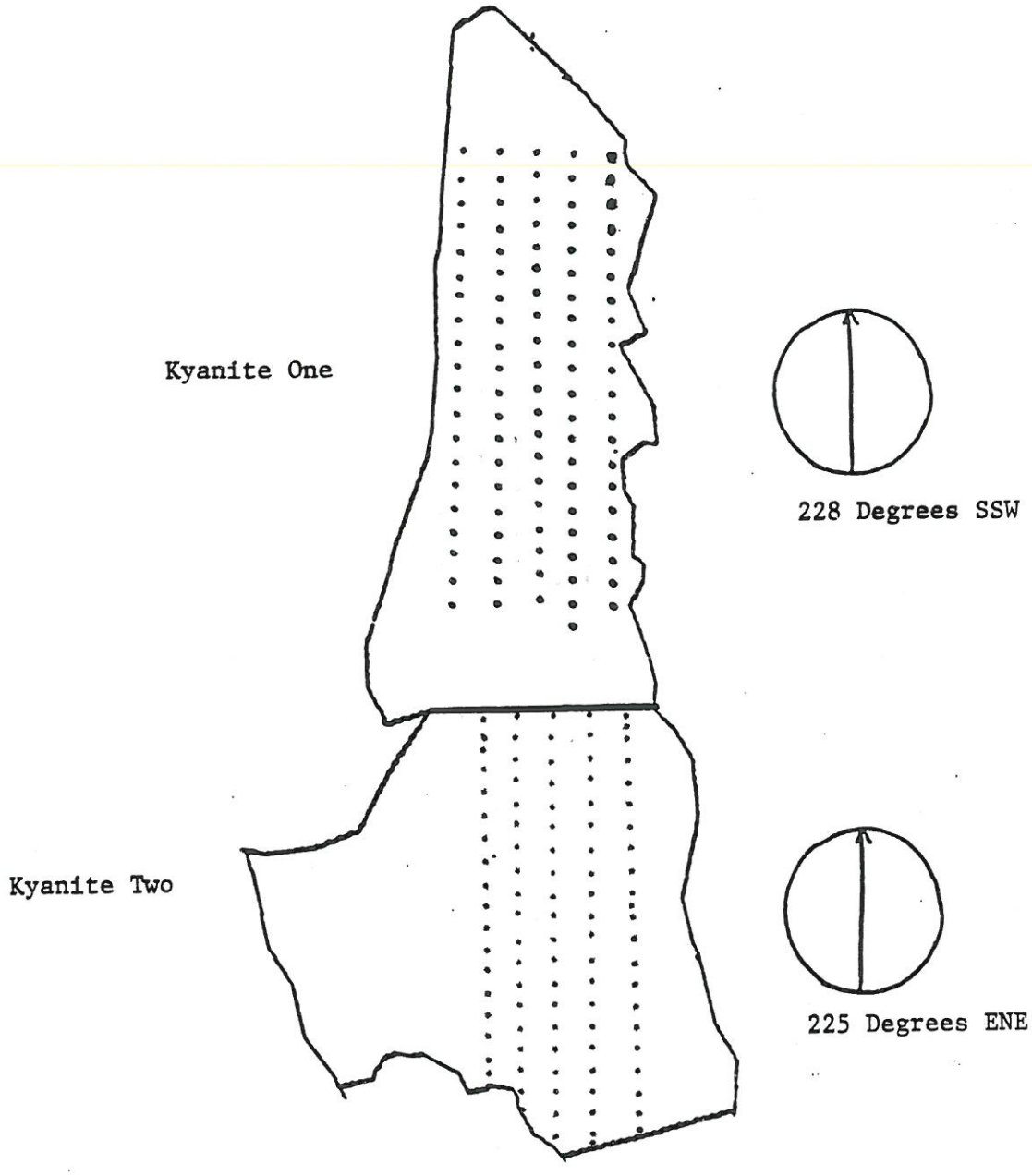
1cm = 40 meters

1.5cm = 50 meters



75 Degrees ENE

Kyanite One & Kyanite Two



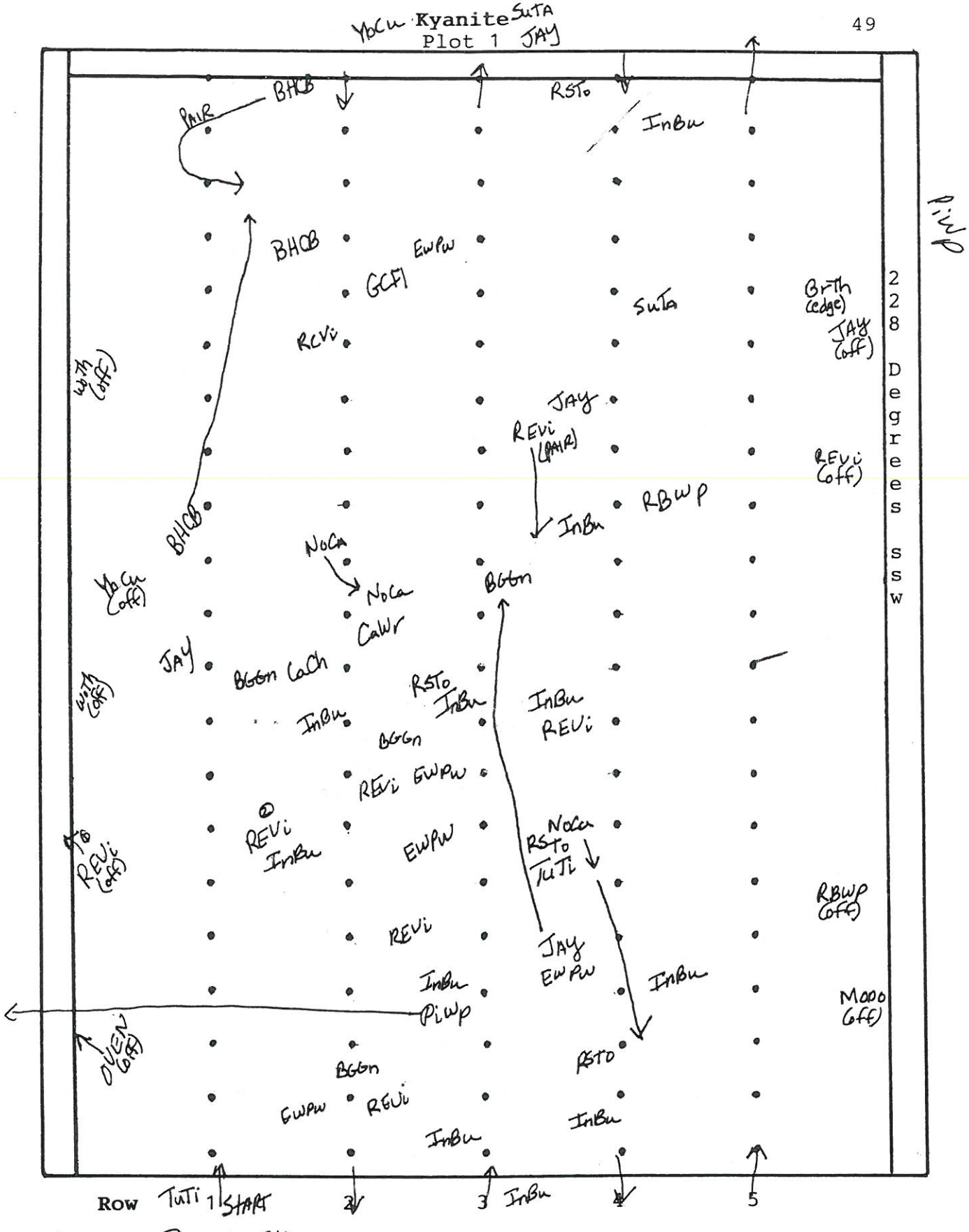
Scale

1cm = 40 meters

1.5 cm = 50 meters

Appendix II

This appendix contains copies of all of the field data sheets produced during the 1999 field censuses. Census was taken nine times on each plot. The sheets are in chronological order. Codes used on the sheets are explained in the Methods section.

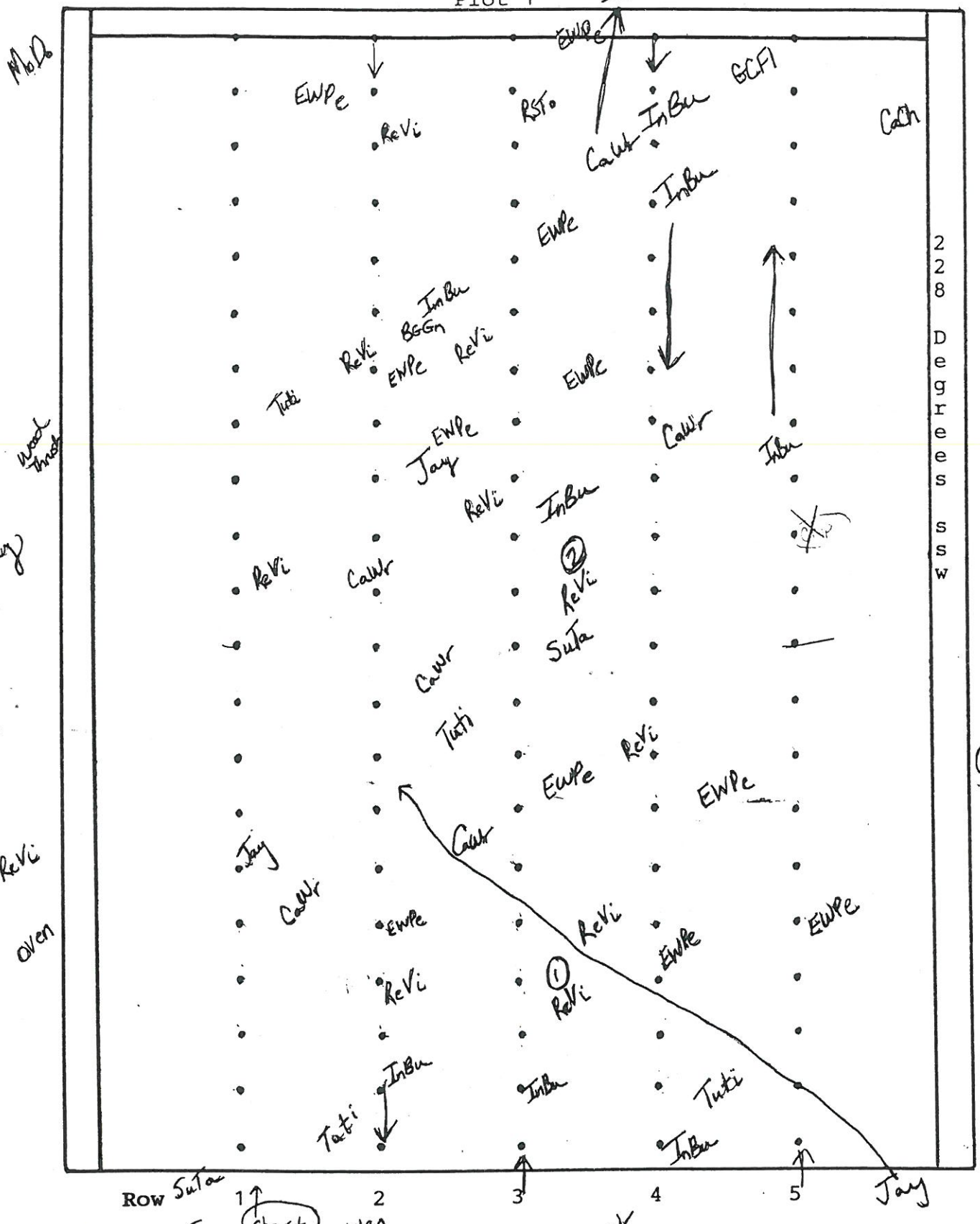


Observer Patrick Collins
Date 5-25-99
Start Time 6:20AM
Start Temp 11°C
Sky 0
Wind 1
End Time 8:13
End Temp 20°C

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

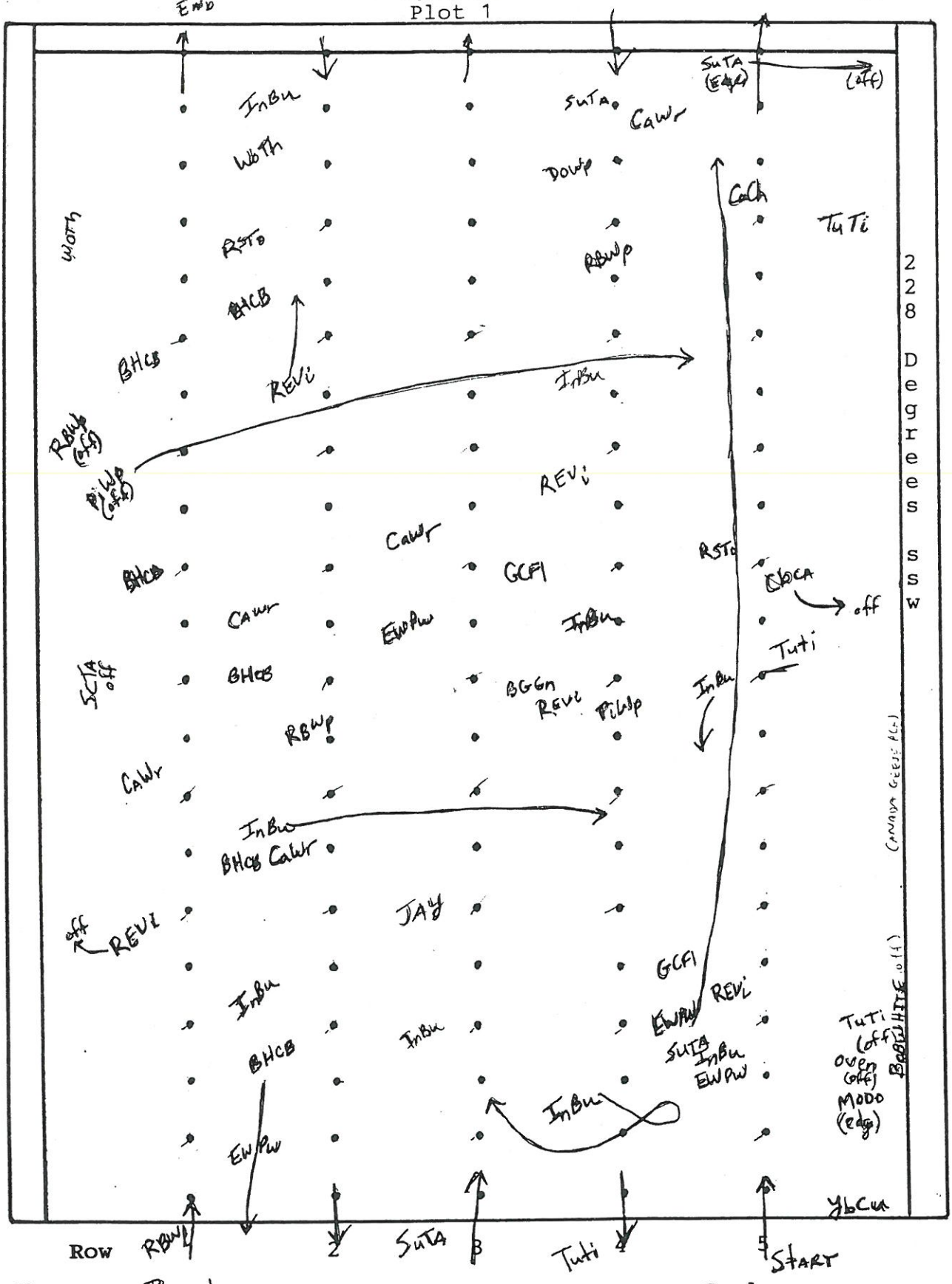


Observer Sally
Date 5/27/99
Start Time 6:10
Start Temp 8°C
Sky 0
Wind 1
End Time 8:20
End Temp 11°C

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

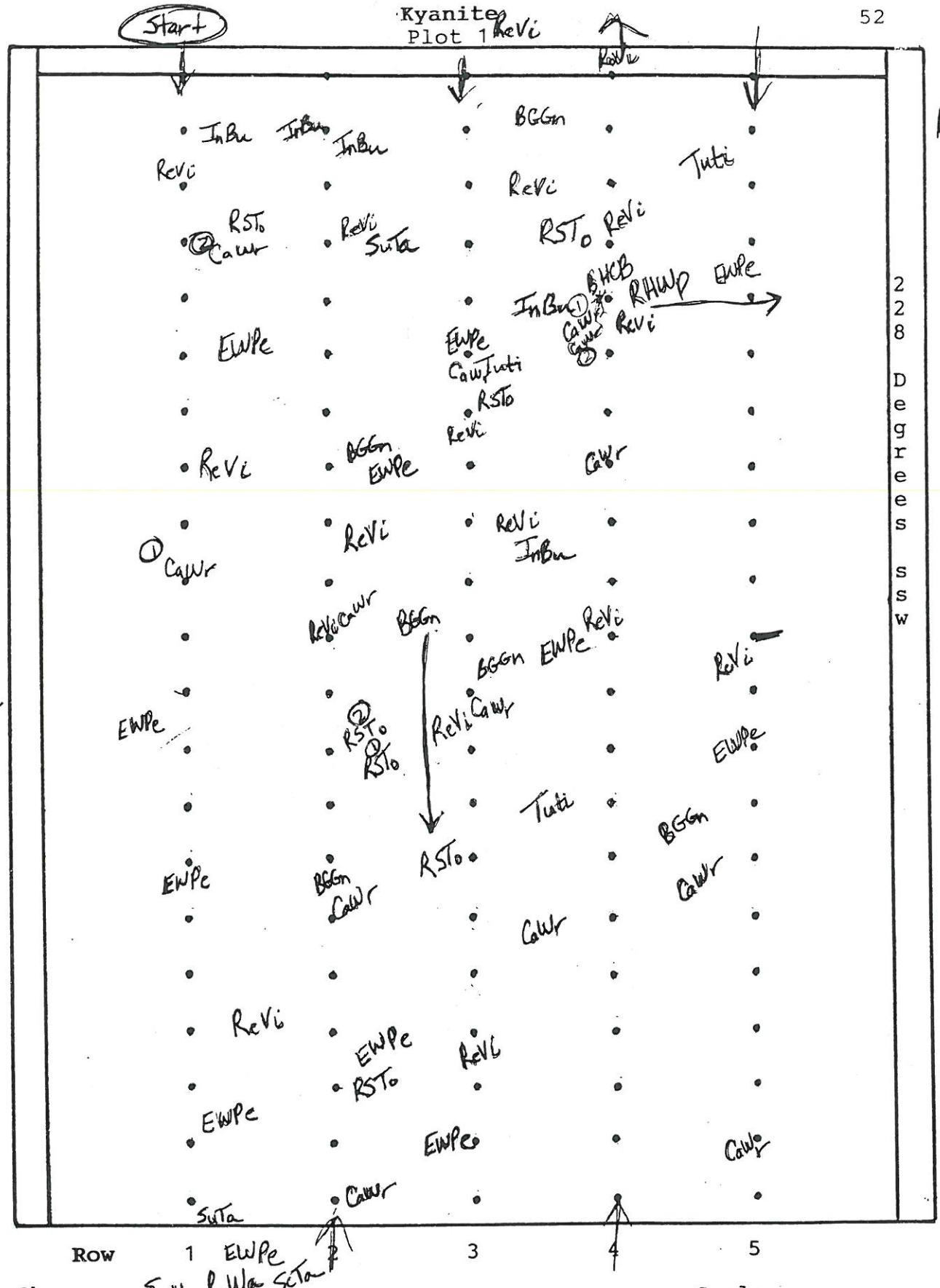


Observer Patrick
Date 5-28-99
Start Time 6:30 AM
Start Temp 8°C
Sky 0
Wind 1
End Time 8:15 AM
End Temp 12°C

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

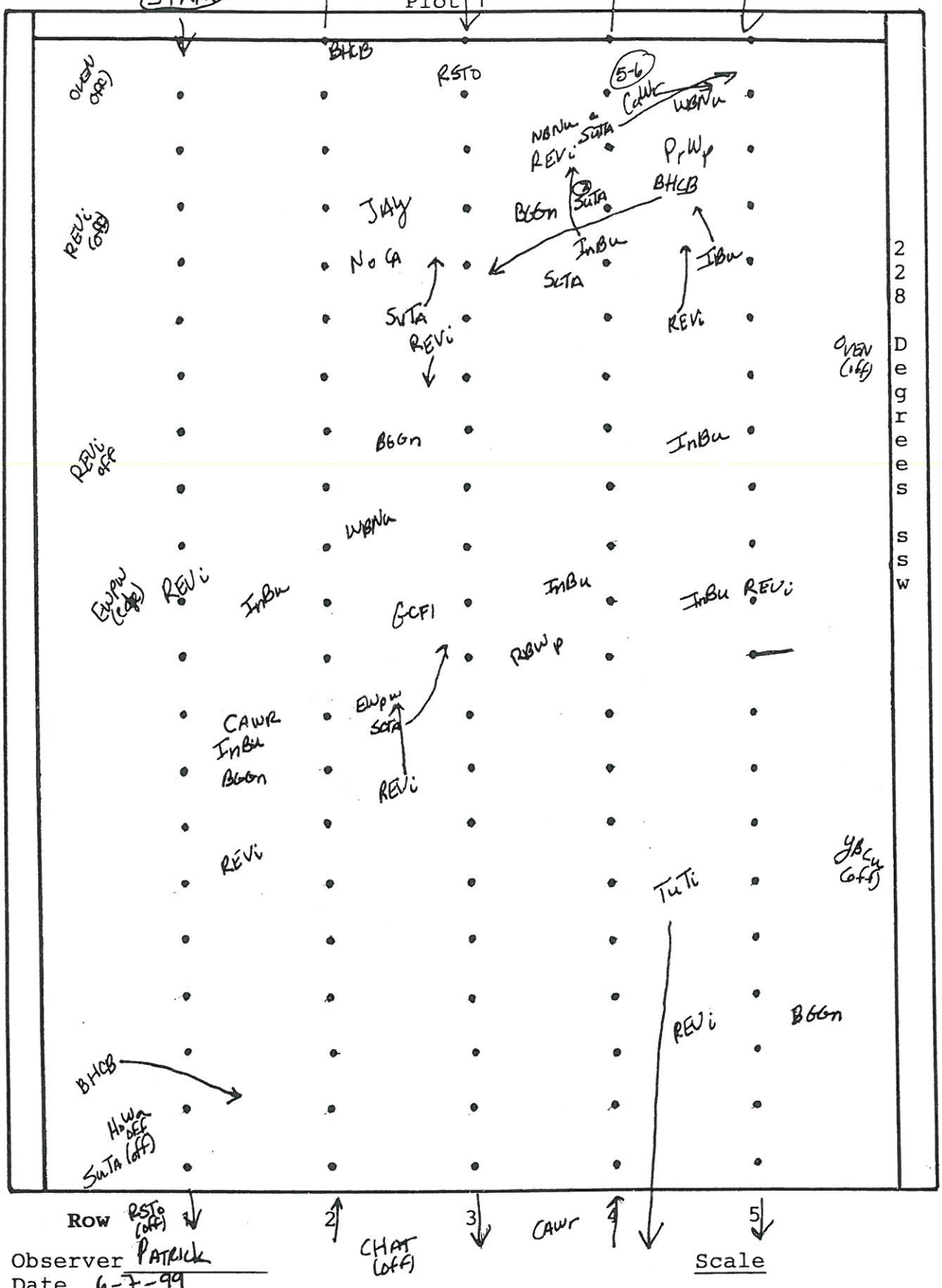


Observer Sally PrWa ScTa
Date 5/31/99
Start Time 6:20AM
Start Temp 14°C
Sky 0
Wind 1
End Time 8:15AM
End Temp 21°C

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite Plot 1

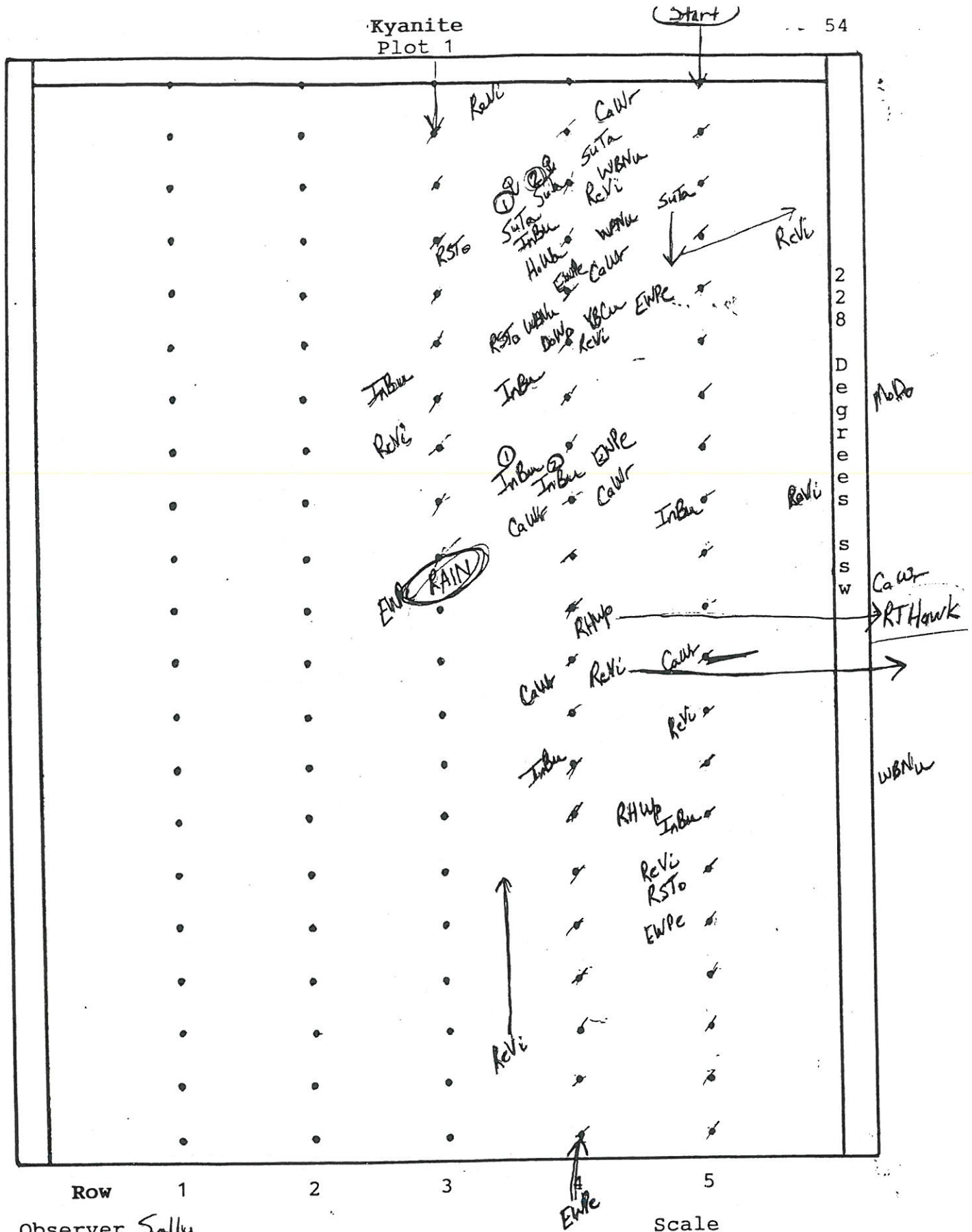


Observer PATRICK
Date 6-7-99
Start Time 6:15
Start Temp 14°C
Sky 0
Wind 2
End Time 8:20
End Temp 25°C

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

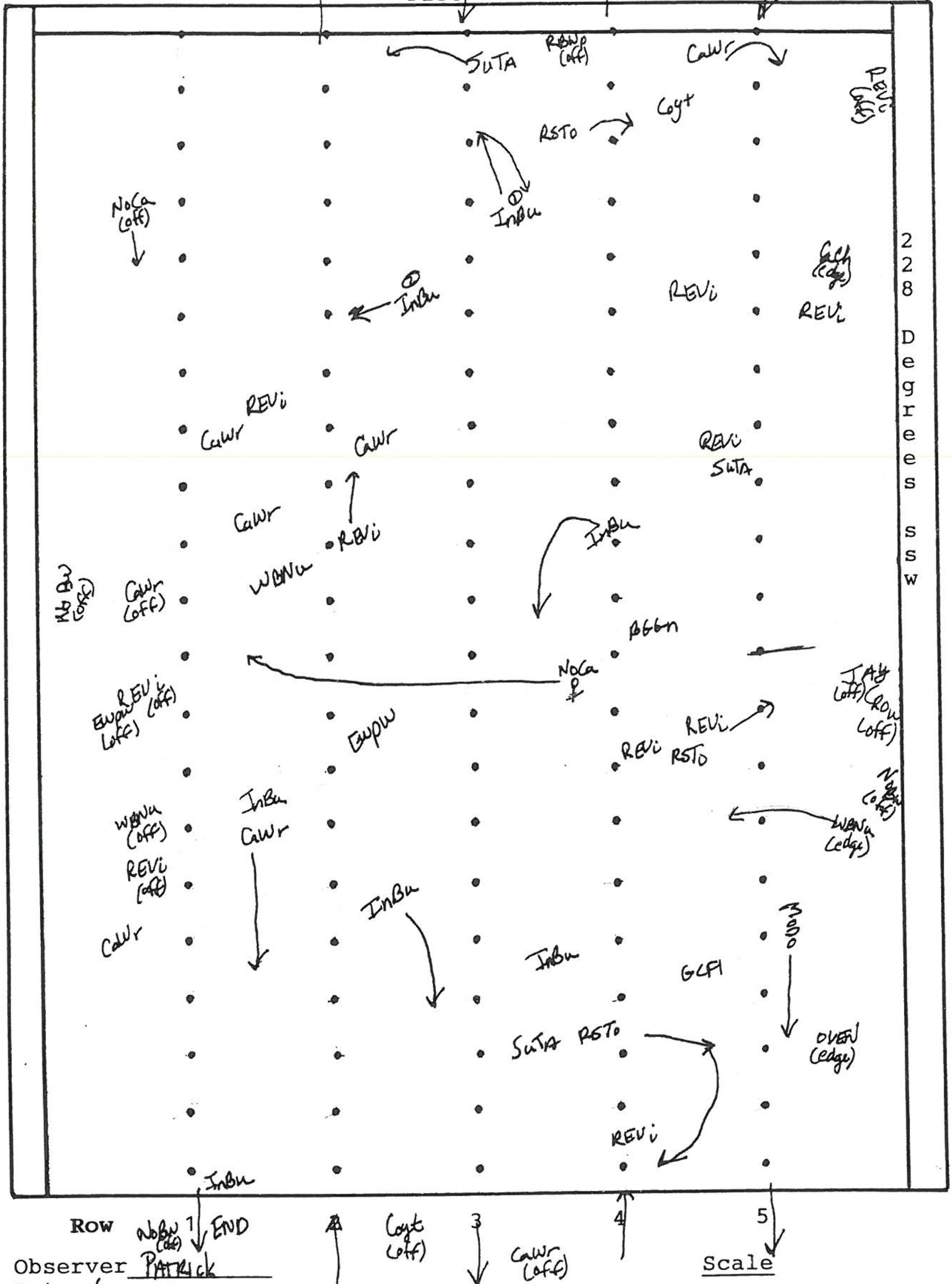


Observer Sally
Date 6/15/99
Start Time 6:15 AM
Start Temp 21°C
Sky 3
Wind 2
End Time 7:30 AM
End Temp 20°C

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

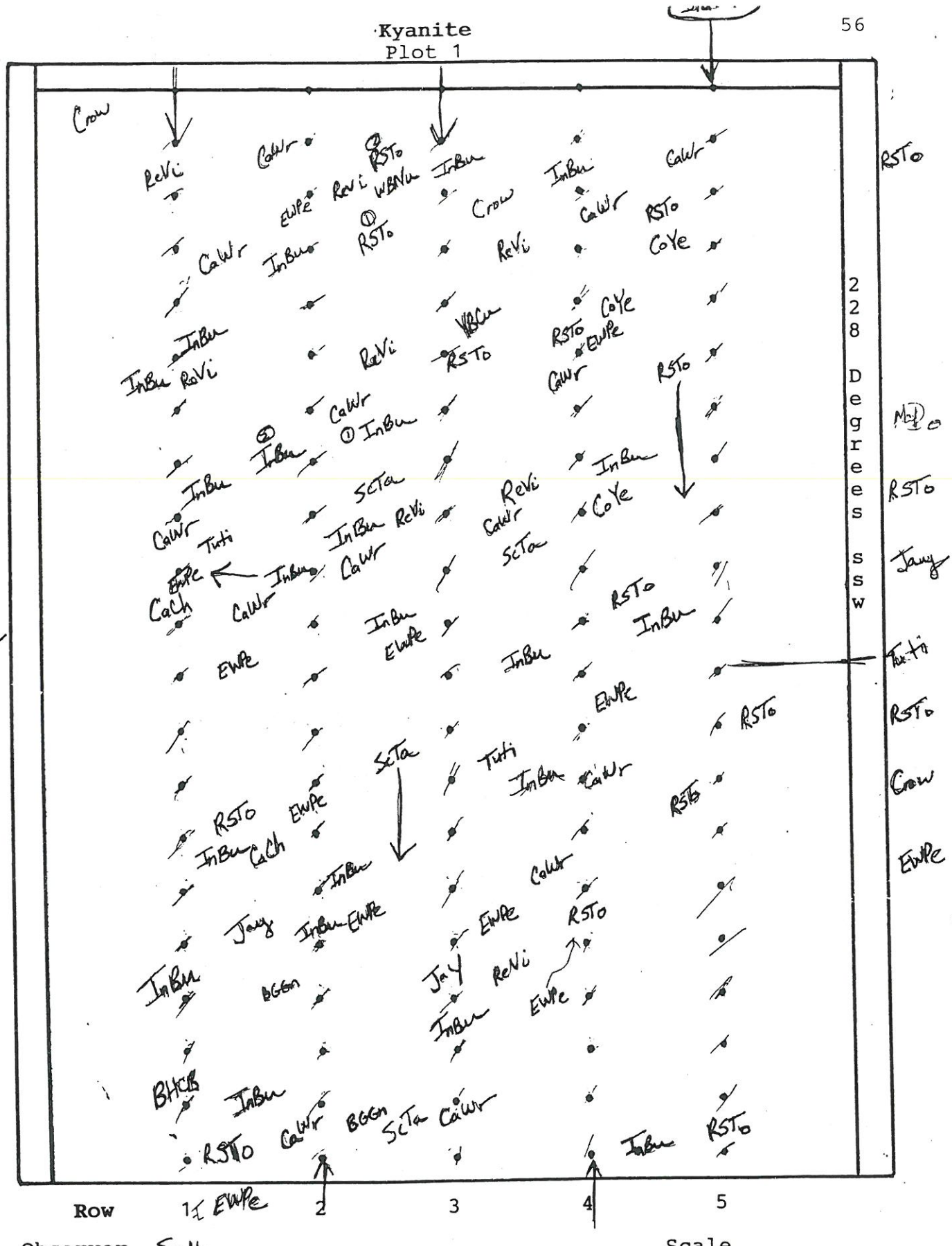


Observer Patrick
Date 6-24-99
Start Time 6:10
Start Temp 13°C
Sky 0
Wind 1
End Time 7:50
End Temp 16°C

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

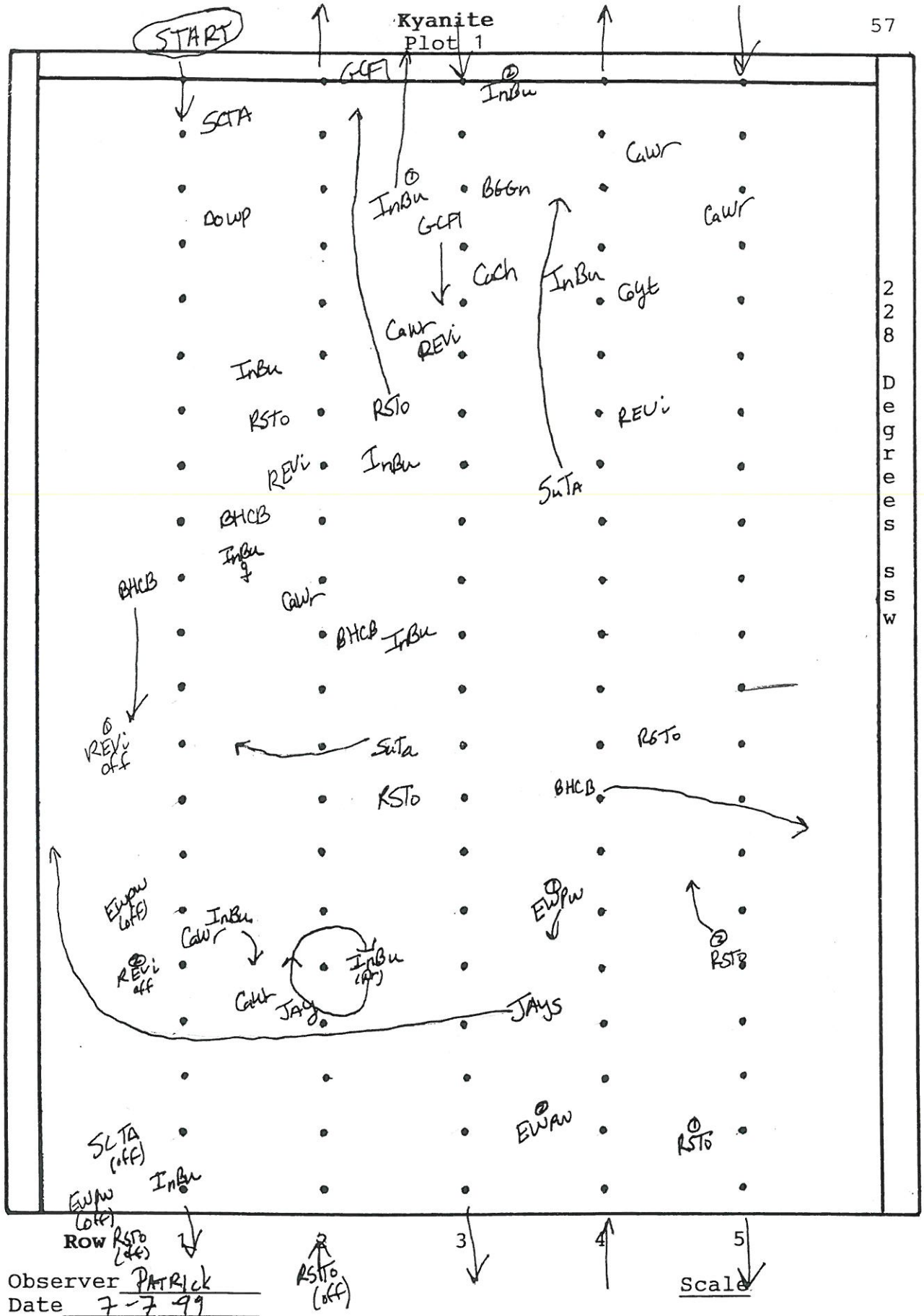


Observer Sally
Date 7/6/99
Start Time 6:10AM
Start Temp 24°C
Sky /
Wind /
End Time 7:40 AM
End Temp 27°C

Scale

1 in. = 50 m
1 cm = 20 m

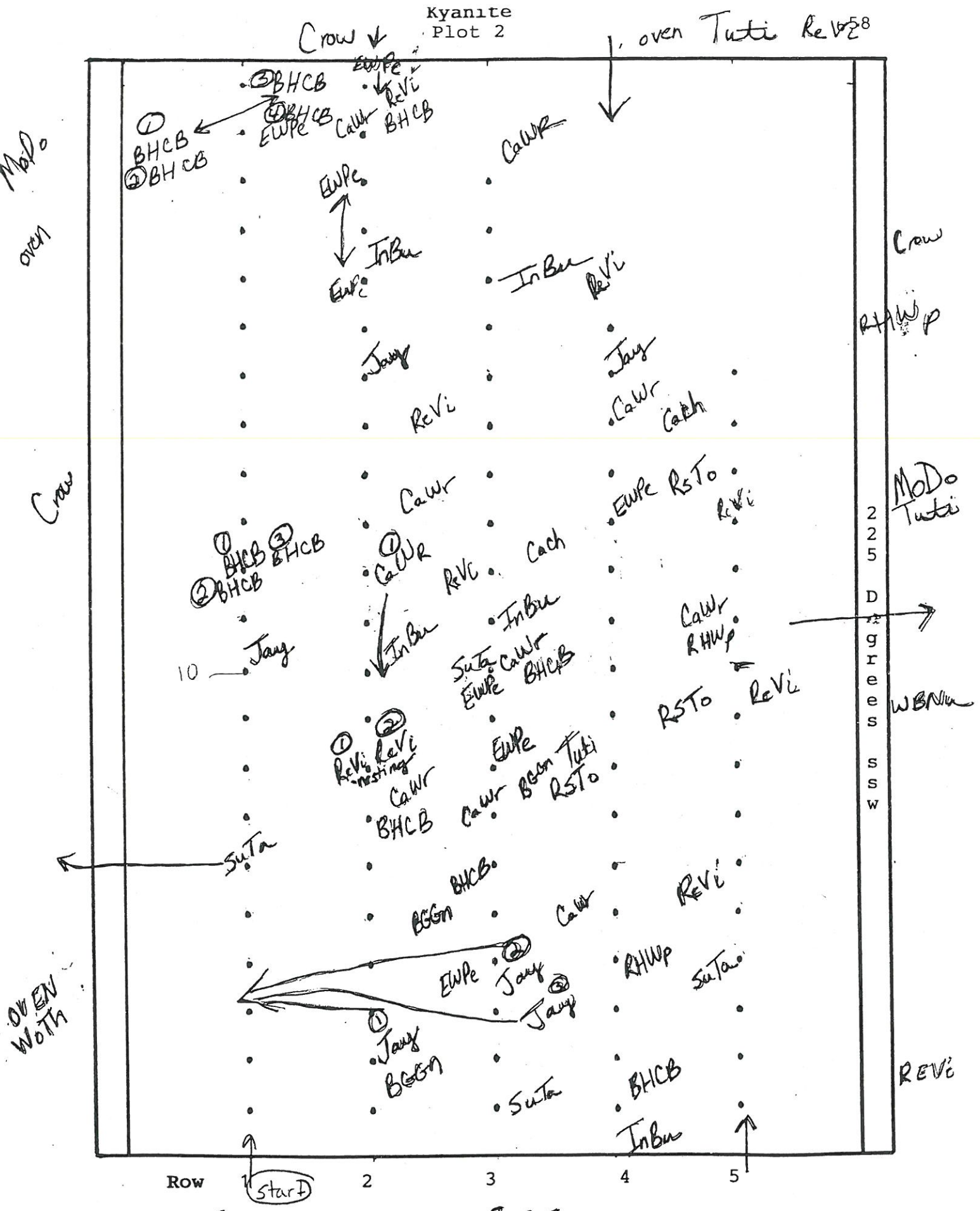
Kyanite Plot 1



Observer Patrick
Date 7-7-99
Start Time 6:15
Start Temp 23°C
Sky 0
Wind 1
End Time 7:57
End Temp 29°C

Scale

1 in. = 50 m
1 cm = 20 m

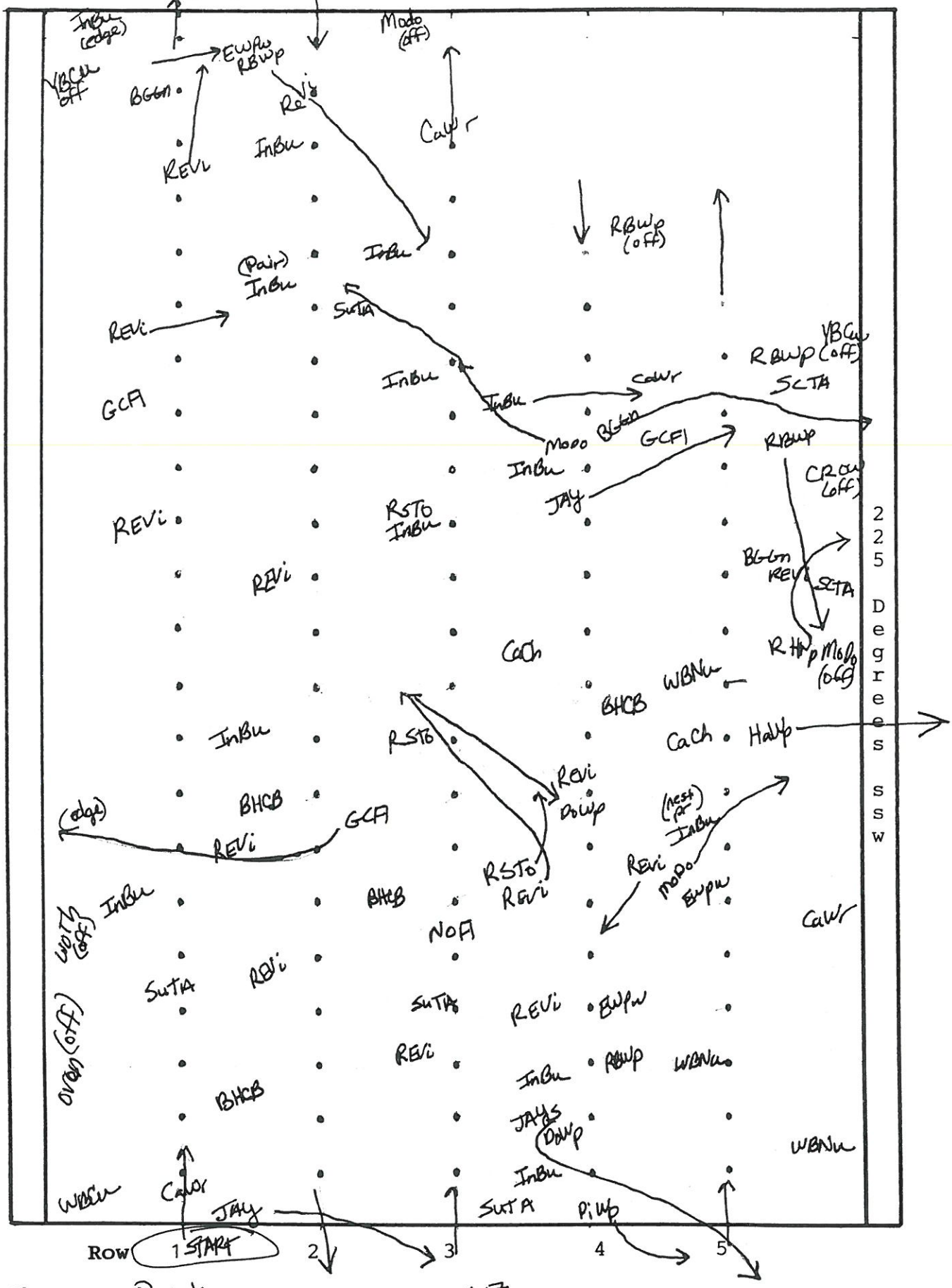


Observer Sally
Date 5/25/99
Start Time 6:20
Start Temp 11°C
Sky O

End Time 8:35
End Temp 20°C

Scale

1 in. = 50 m
1 cm = 20 m



Observer Patrick
Date 5-27-99
Start Time 6:10
Start Temp 8°C
Sky 0
Wind 1

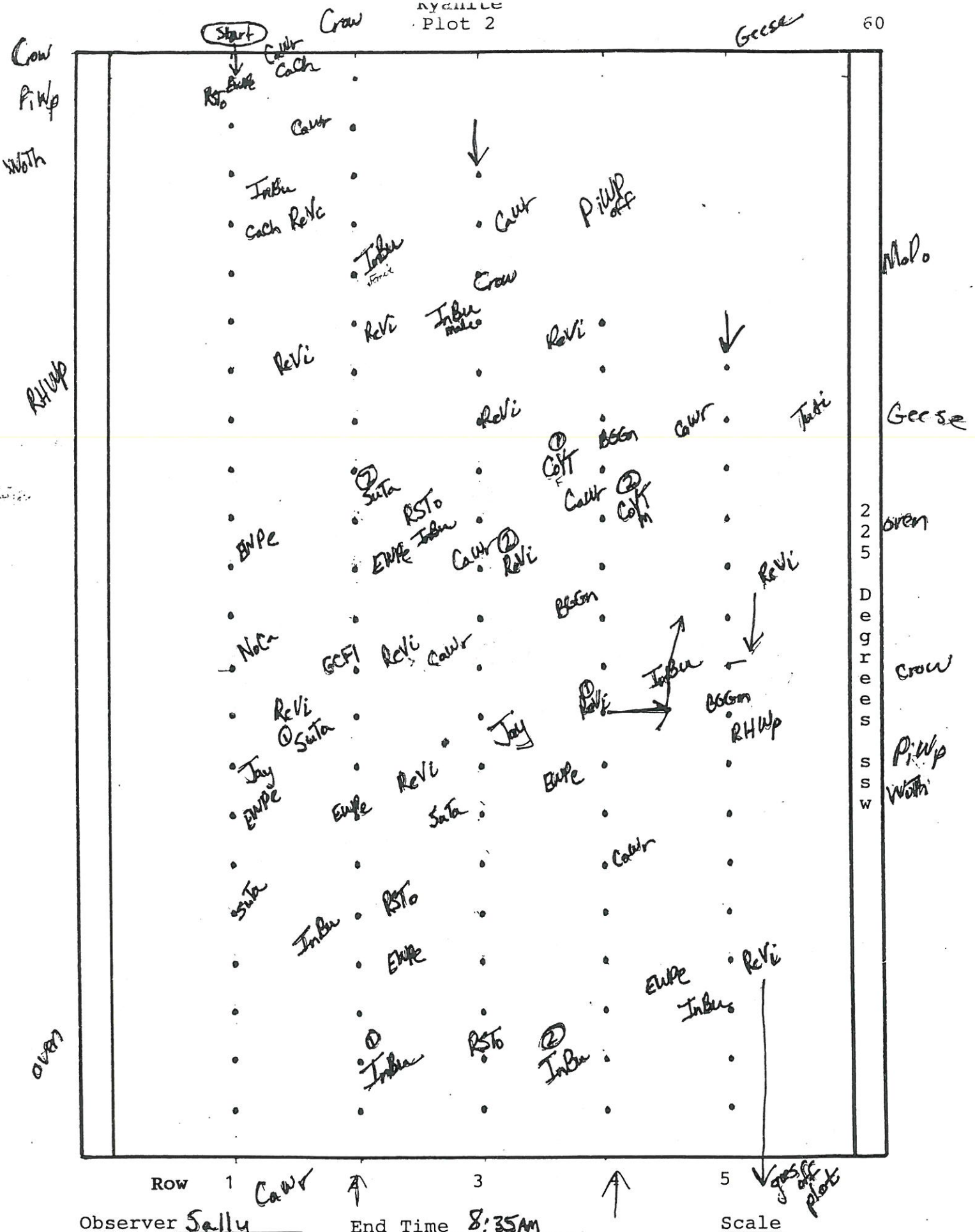
End Time 8:17
End Temp 12°C

Scale

1 in. = 50 m
1 cm = 20 m

Rycrite

Plot 2

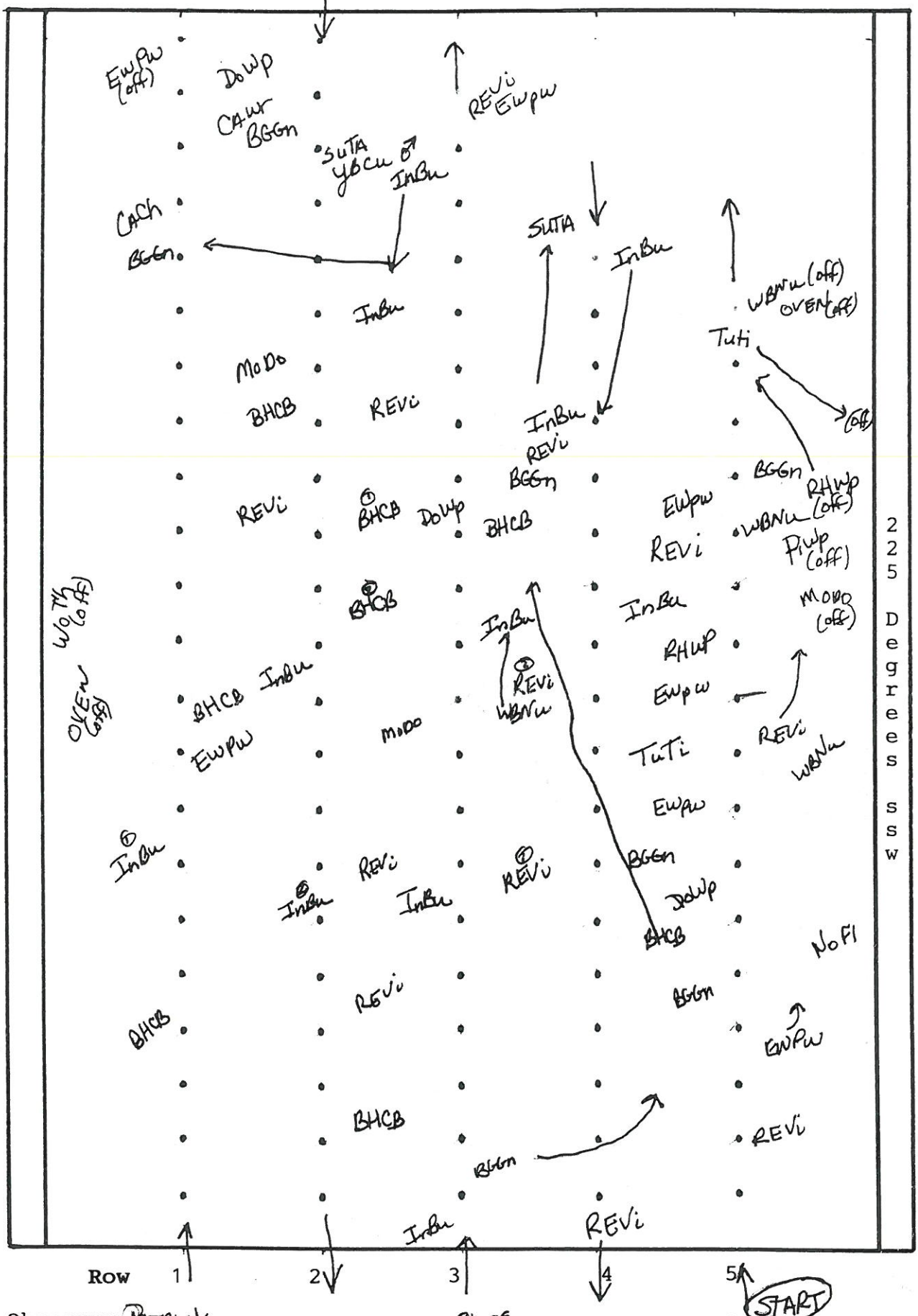


Observer Sally
Date 5/28/99
Start Time 6:20AM
Start Temp 8°C
Sky 0

End Time 8:35AM
End Temp 14°C

Scale

1 in. = 50 m
1 cm = 20 m

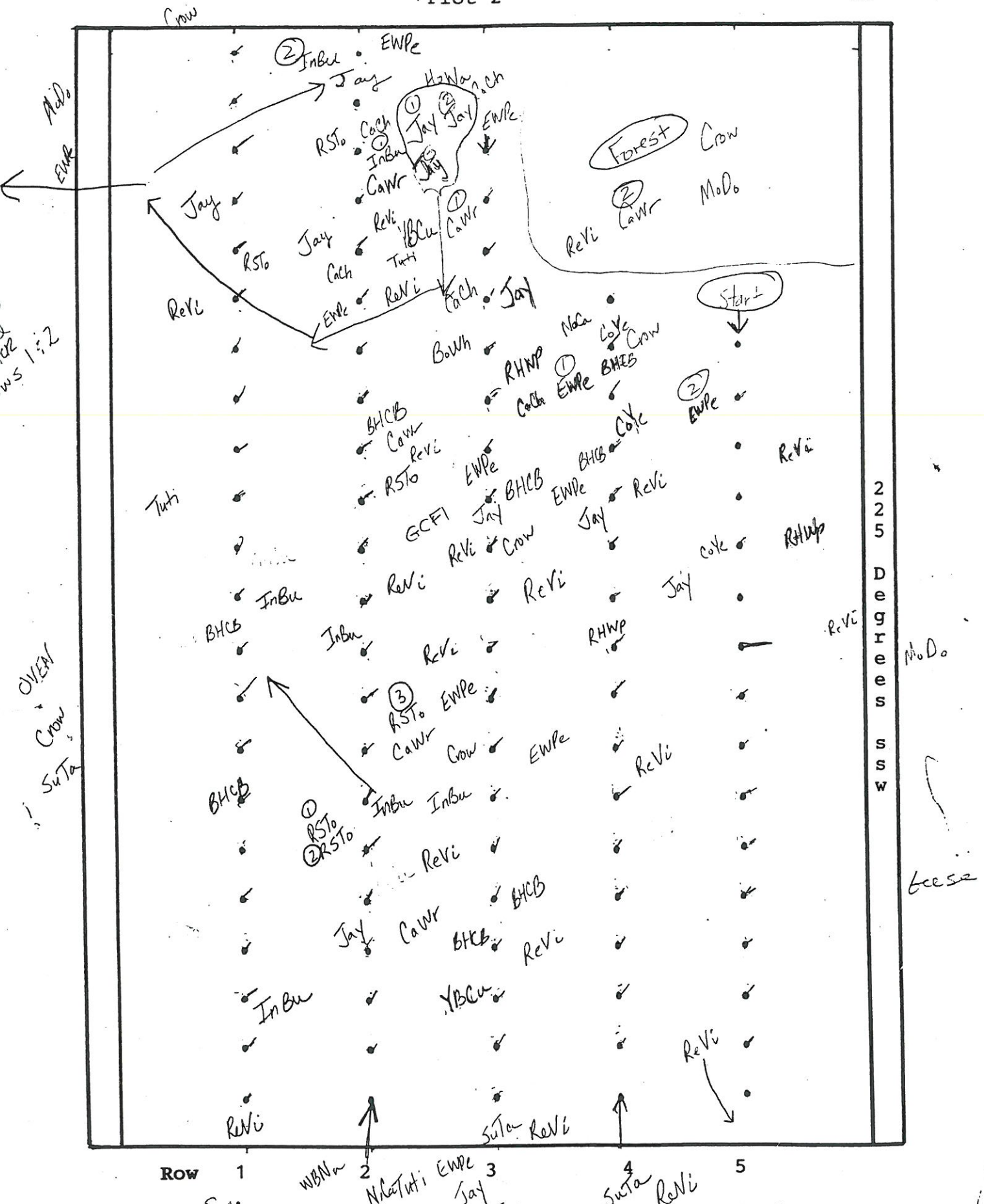


Observer PATRICK
Date 5-31-99
Start Time 6'20
Start Temp 14°C
Sky D
Wind 1

End Time 8:06
End Temp 24°C

Scale

1 in. = 50 m
1 cm = 20 m



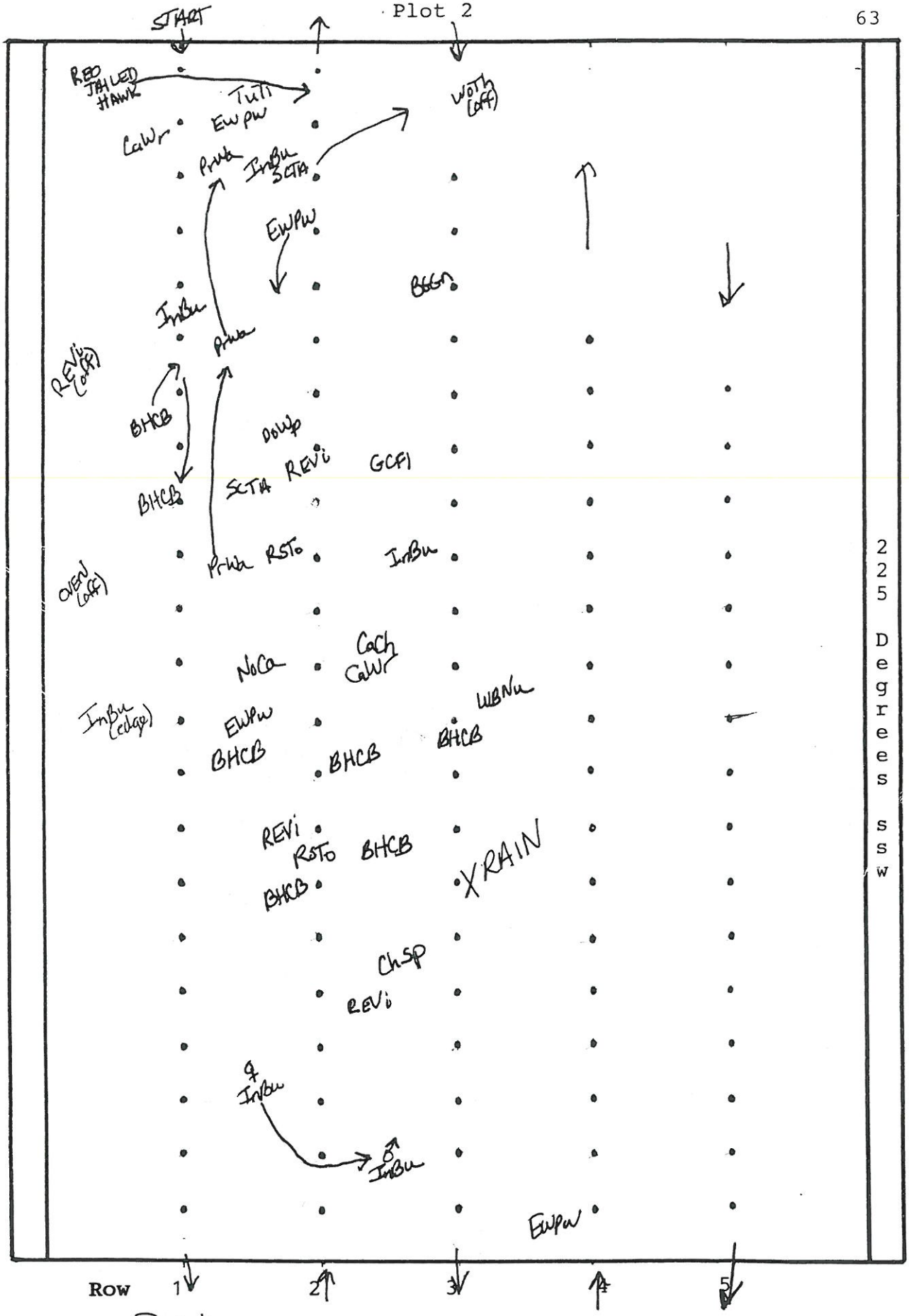
Observer Sally
Date 6/7/99
Start Time 6:20AM
Start Temp 14°C
Sky 0

End Time 8:30AM
End Temp 25°C

Scale

1 in. = 50 m
1 cm = 20 m

Plot 2



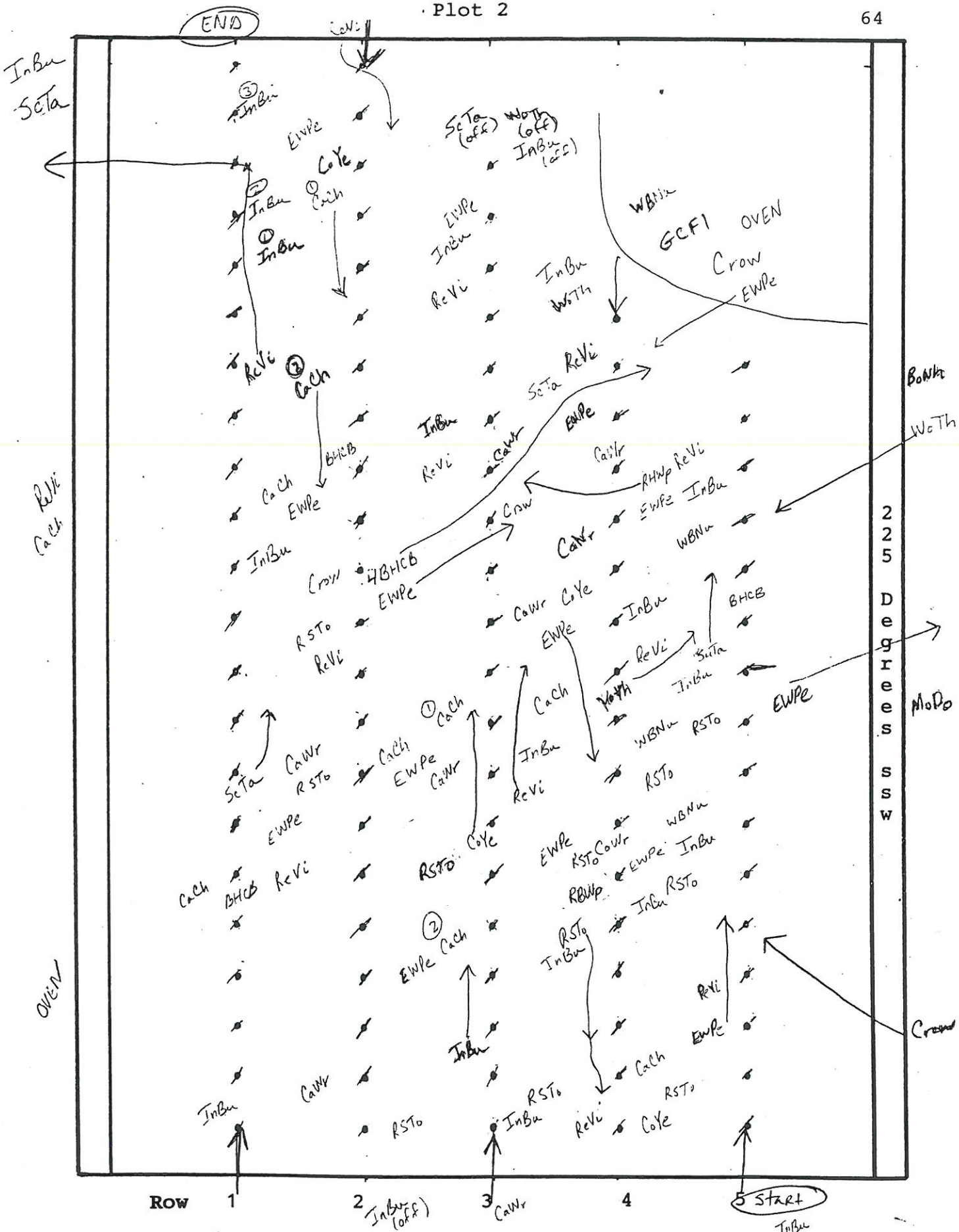
Observer PATRICK
Date 6-15-99
Start Time 6:15
Start Temp 21°C
Sky 3 dri 22Wng
Wind 2

End Time 7:35AM
End Temp 20°C

Scale

1 in. = 50 m
1 cm = 20 m

Plot 2

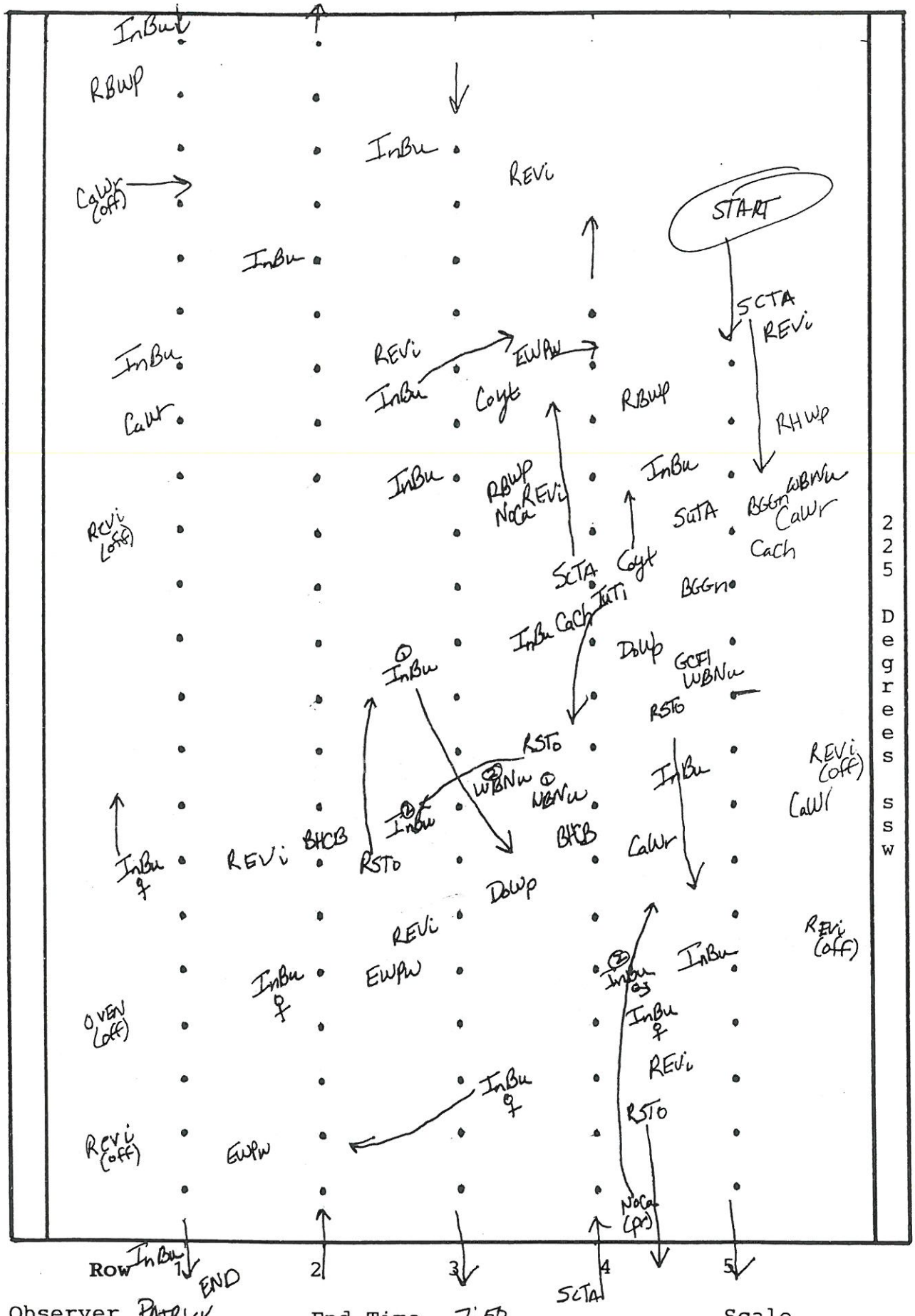


Observer Sally
Date 6/24/99
Start Time 6:10 AM
Start Temp 13°C
Sky 0
Wind 1

End Time 8:05 AM
End Temp 19°C

Scale

1 in. = 50 m
1 cm = 20 m

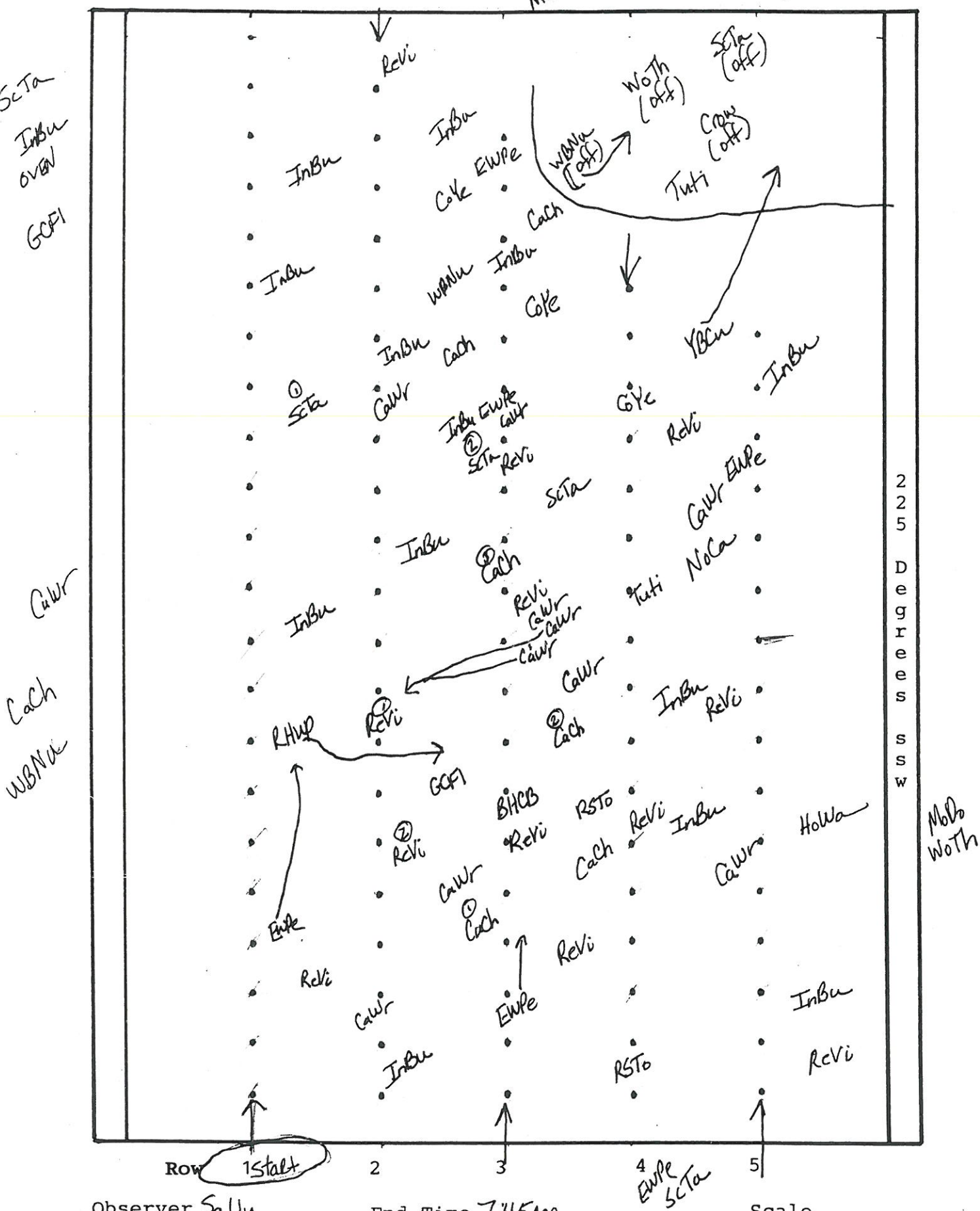


Observer PATRICK
Date 7-6-99
Start Time 6:10
Start Temp 24°C
Sky ⊙
Wind 1

End Time 7:50
End Temp 28°C

Scale

1 in. = 50 m
1 cm = 20 m

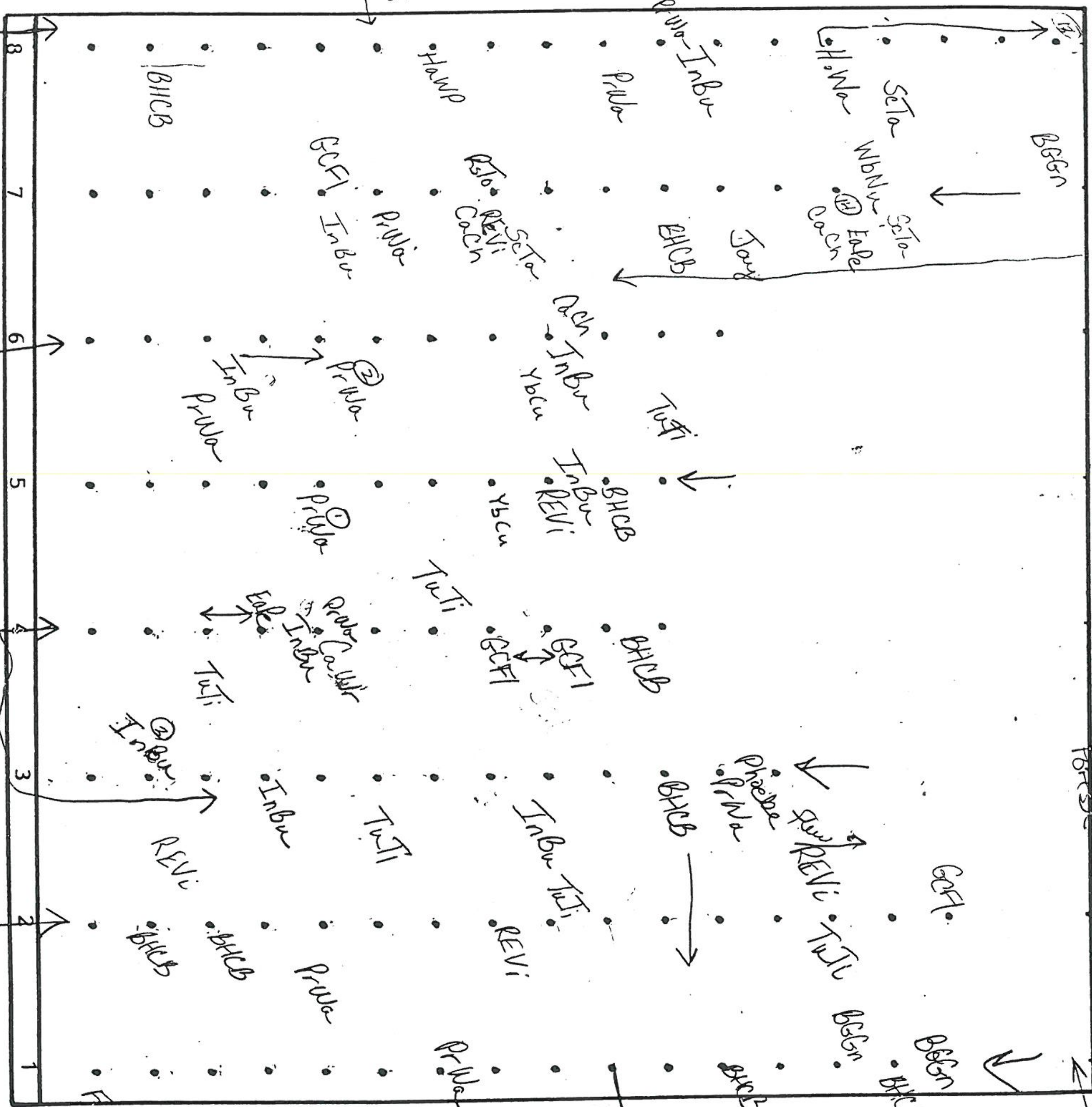


Observer Sally
Date 7/8/99
Start Time 6:15AM
Start Temp 23°C
Sky 0
Wind 1

End Time 7:45AM
End Temp 27°C

Scale

1 in. = 50 m
1 cm = 20 m



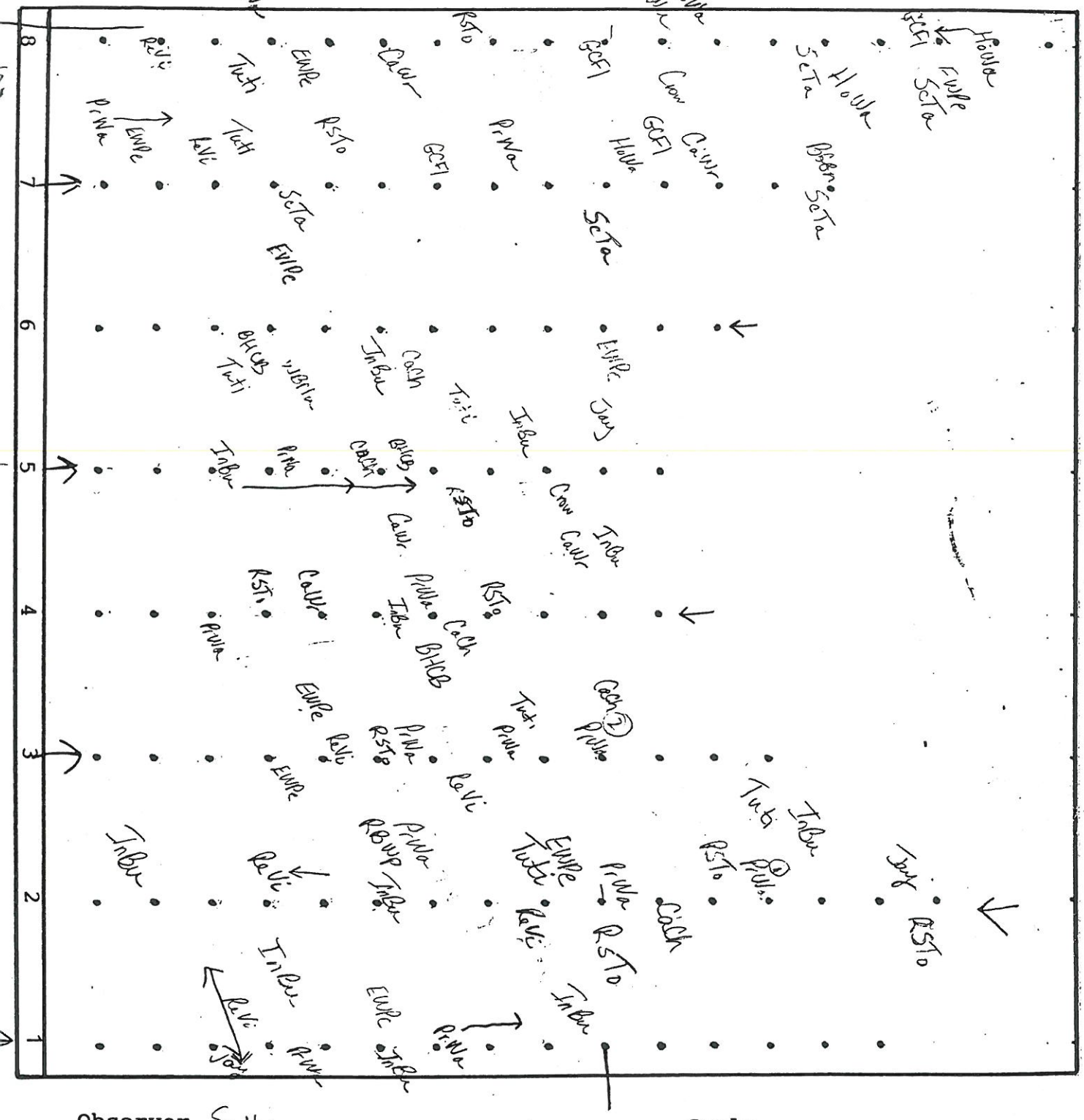
Observer Patrick & Sally
Date May 22, 1999
Start Time 6:25
Start Temp 17°C
Sky 0
Wind 1
End Time 9:26
End Temp 29°C

Rows 75 Degrees ENE

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 1

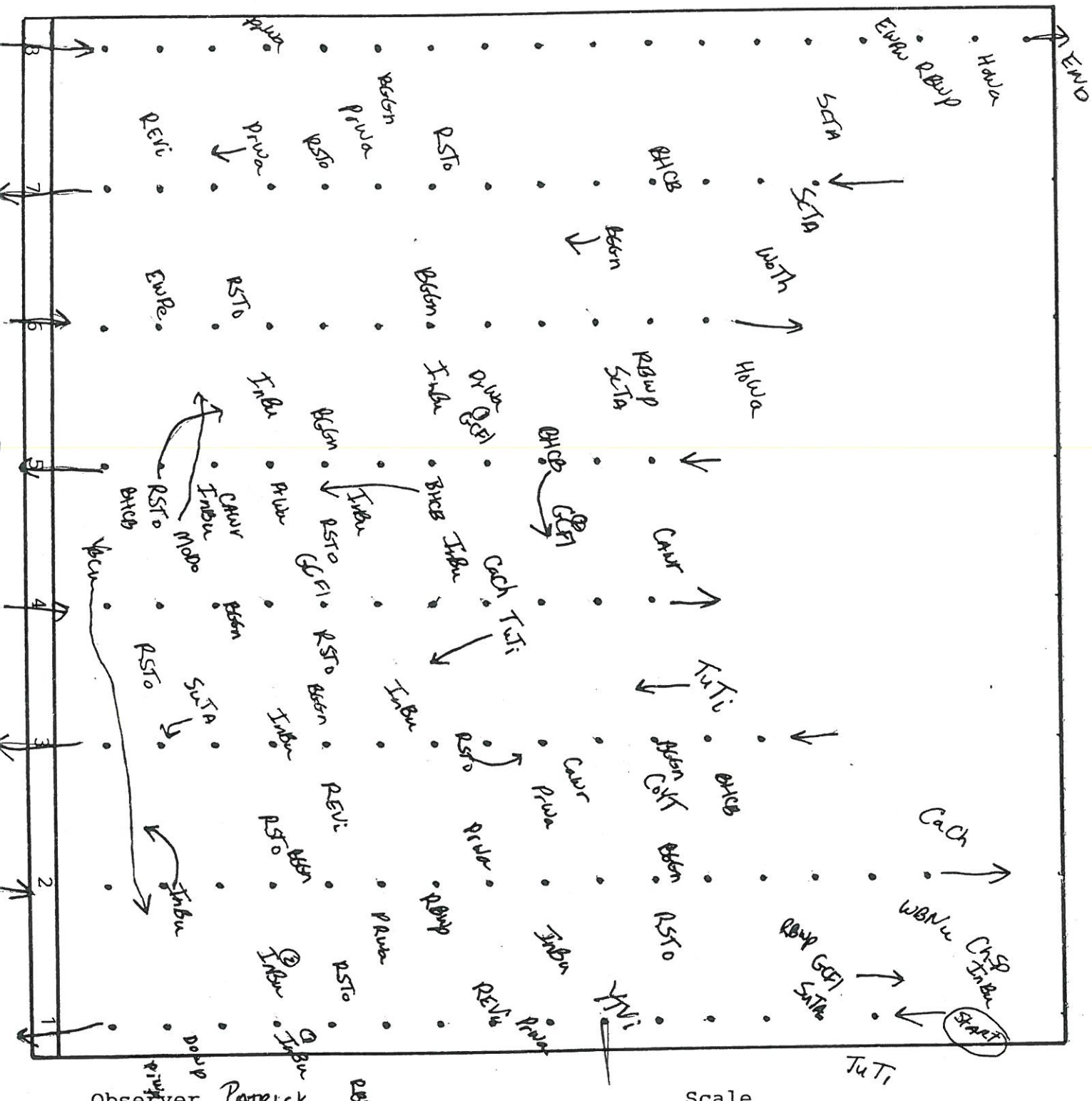


Observer Sally
Date 5/26/99
Start Time 6:25AM
Start Temp 11°C
Sky 1
Wind 2
End Time 8:45 AM
End Temp 20°C

Rows 75 Degrees ENE

Scale

1 in. = 50 m
1 cm = 20 m

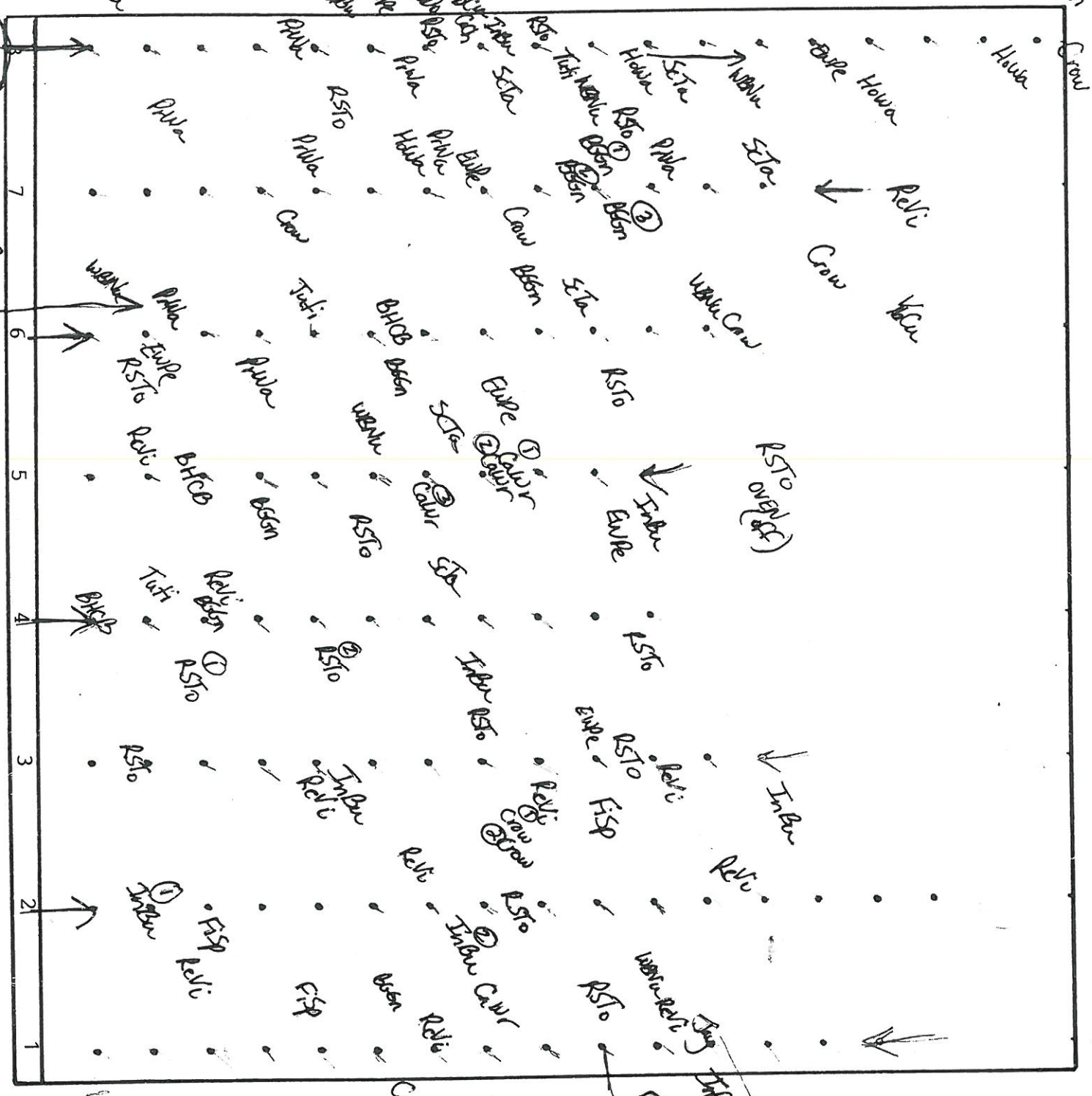


Observer PATRICK
Date 5-29-99
Start Time 6:30
Start Temp 12°C
Sky 0
Wind 1
End Time 8:30AM
End Temp 22°C

Rows 75 Degrees ENE

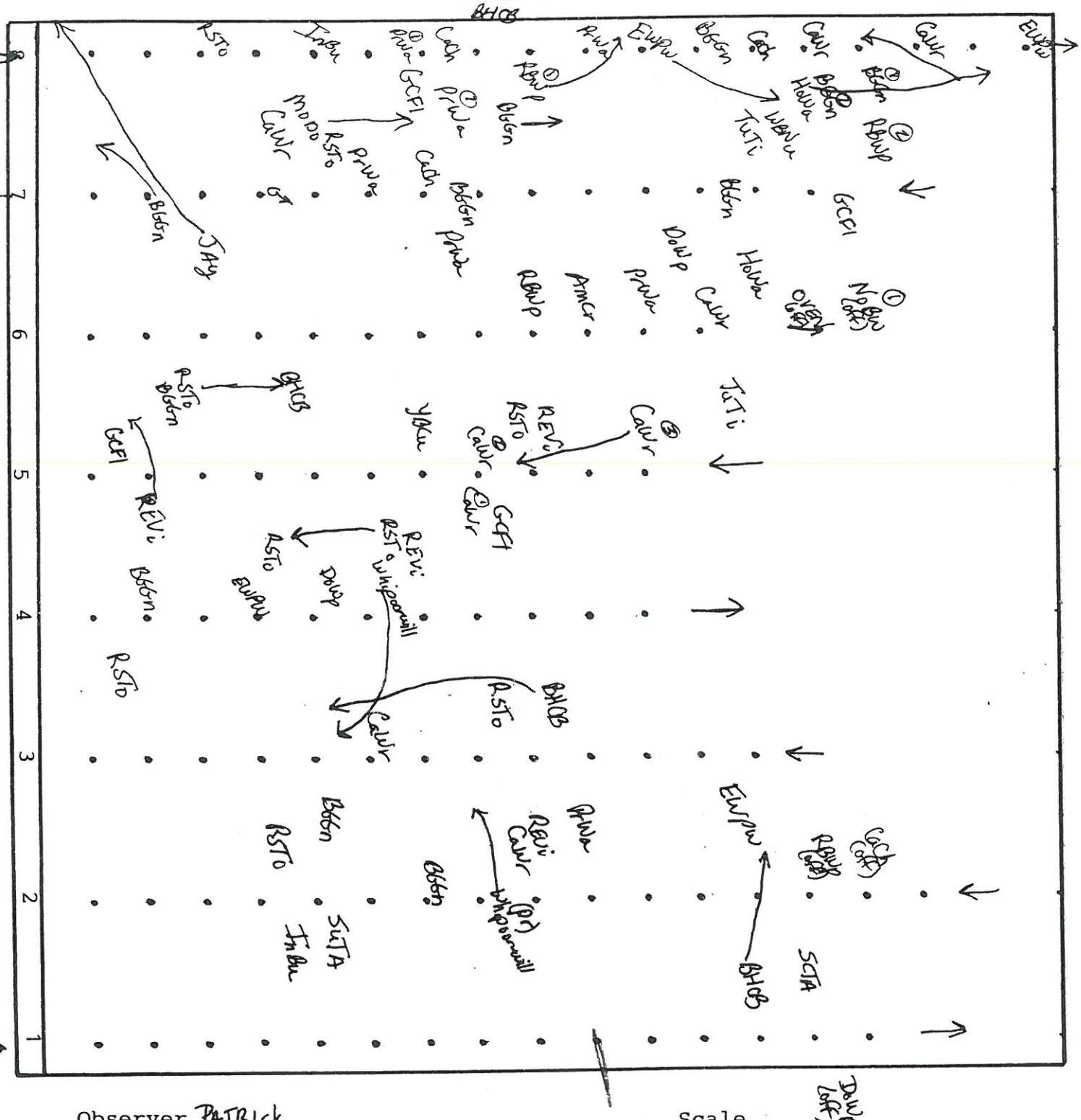
Scale

1 in. = 50 m
1 cm = 20 m



Observer Sally
Date 6/8/99
Start Time 6:15AM
Start Temp 20°C
Sky ⊙
Wind 2
End Time 8:15AM
End Temp 30°C

Rows 75 Degrees ENE



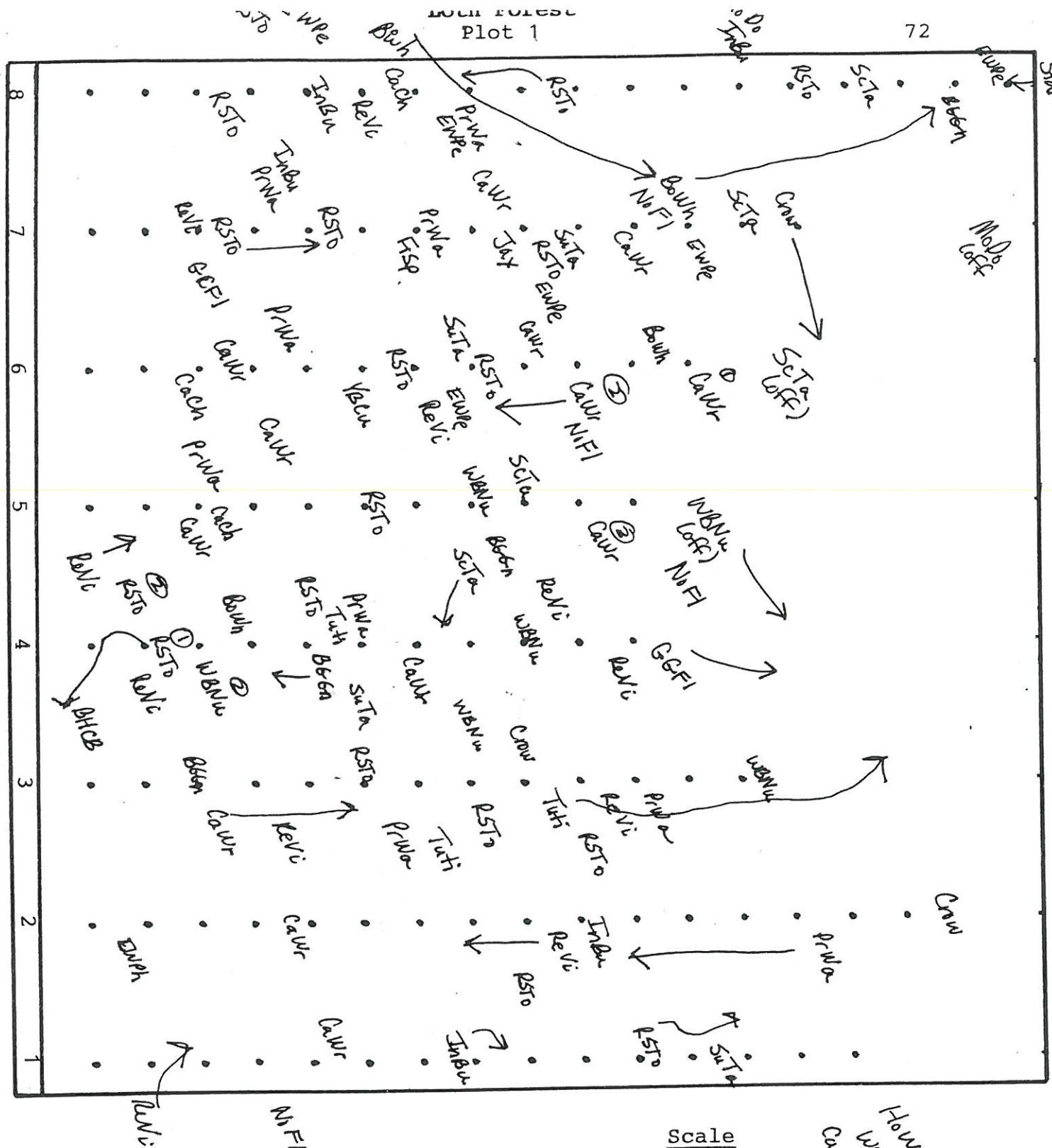
Observer PATRICK
Date 6-14-99
Start Time 6:05
Start Temp 18°C
Sky 0
Wind 1
End Time 7:58
End Temp 27°C

Rows 75 Degrees ENE

Scale

1 in. = 50 m
1 cm = 20 m

Both Forest
Plot 1



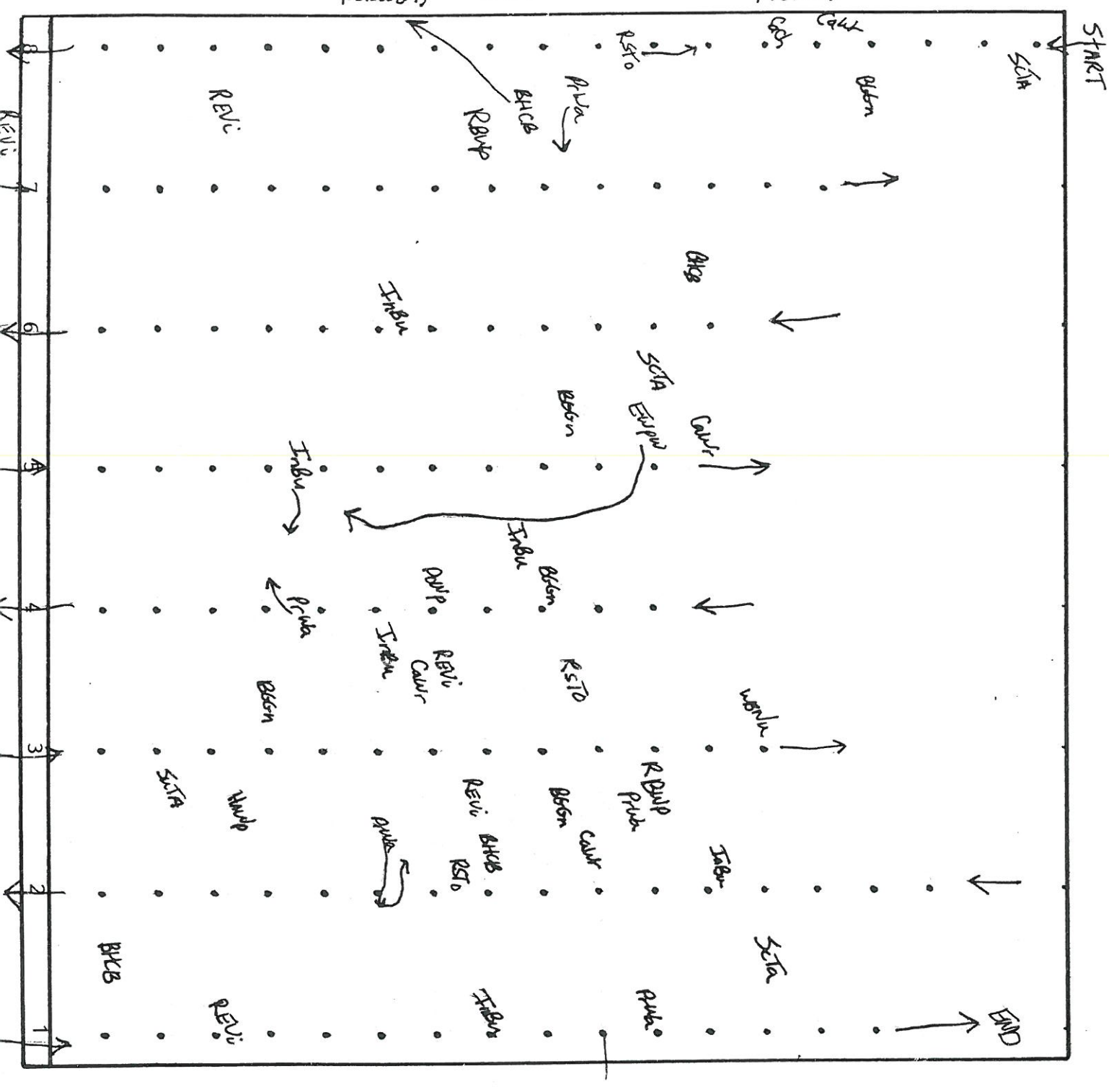
Scale

1 in. = 50 m
1 cm = 20 m

Observer Sally
Date 6/23/98
Start Time 6:10AM
Start Temp 11°C
Sky 0
Wind 1
End Time 8:05AM
End Temp 20°C

Rows 75 Degrees ENE

Plot 1

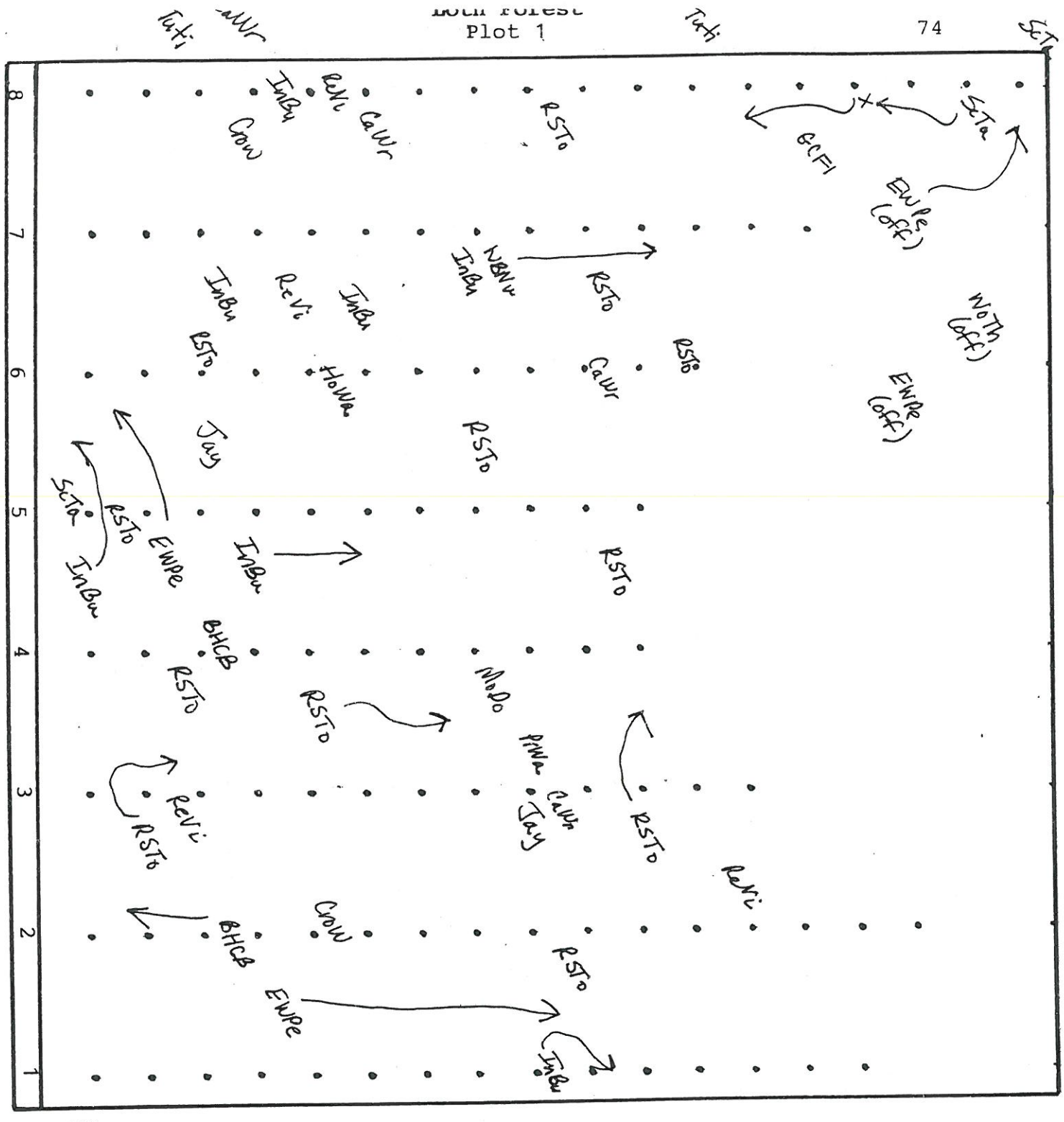


Observer Patrick
Date 6-25-99
Start Time 6:15
Start Temp 20°C
Sky 3
Wind 1
End Time 7:52
End Temp 24°C

Rows 75 Degrees ENE

Scale

1 in. = 50 m
1 cm = 20 m

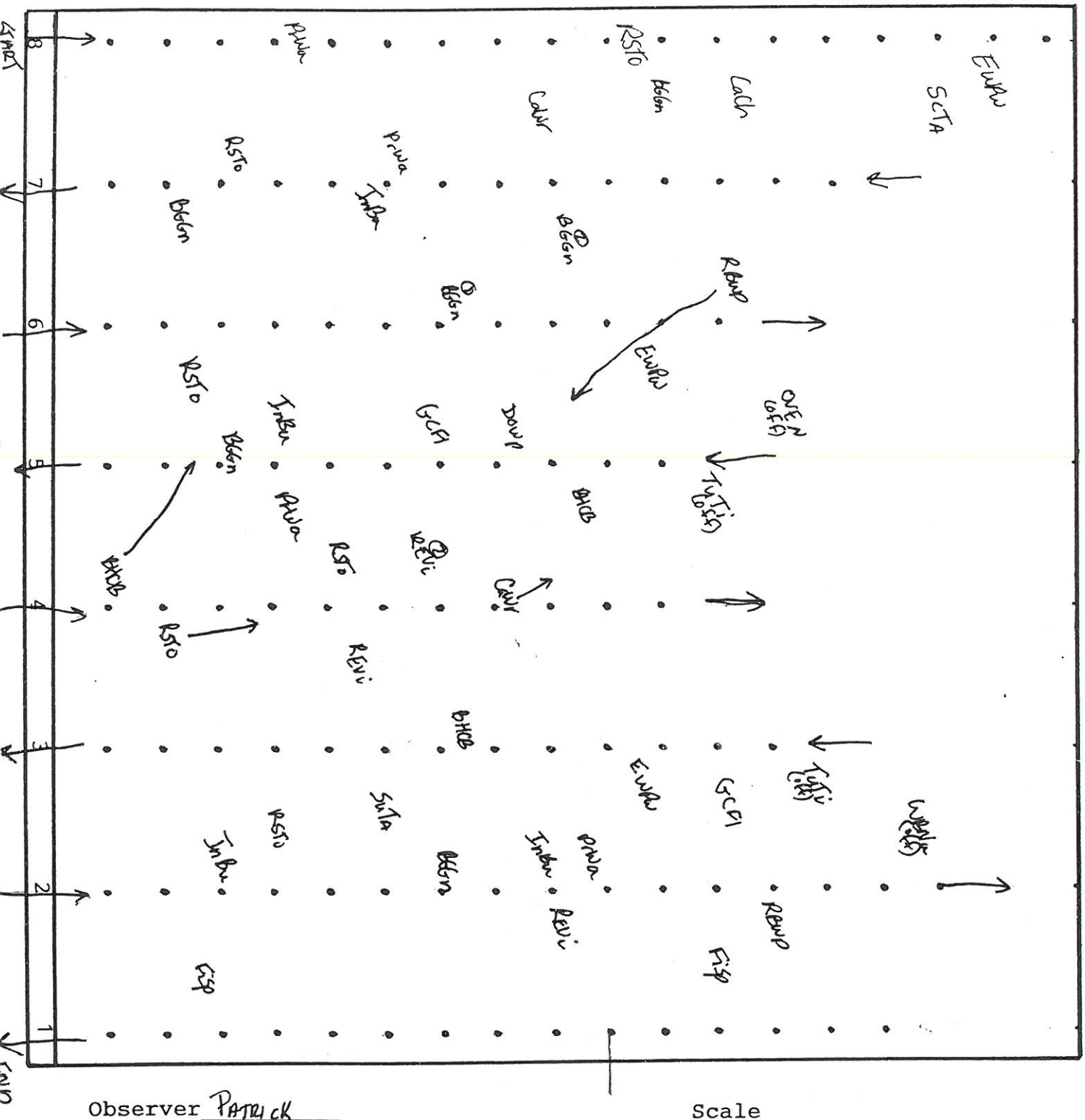


Observer Sally
Date 6/29/99
Start Time 1:30PM
Start Temp 83°F
Sky 2
Wind 2
End Time 2:00PM
End Temp 85°F

Rows 75 Degrees ENE

Scale

1 in. = 50 m
1 cm = 20 m

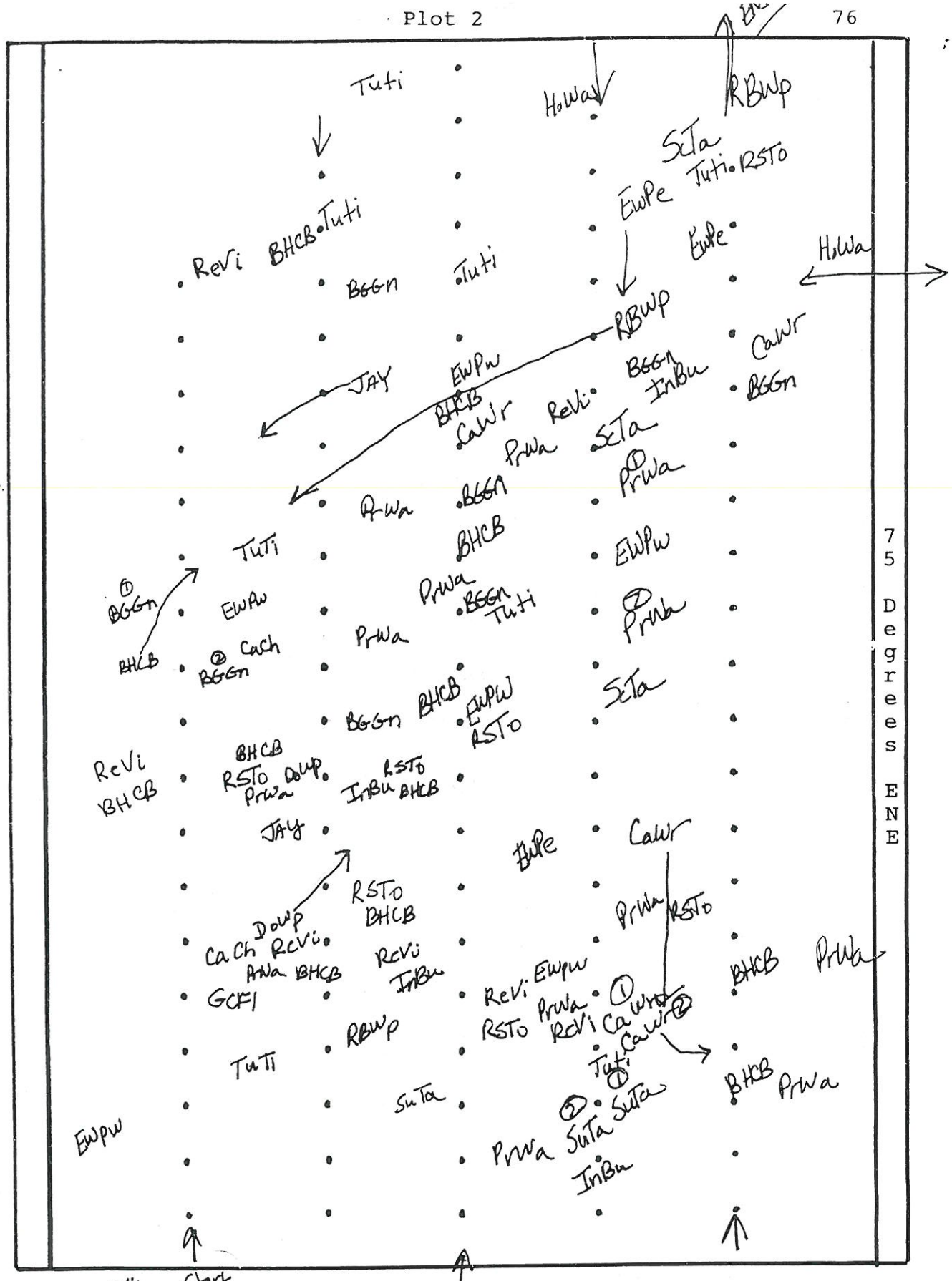


Observer PATRICK
Date 7-2-99
Start Time 6:15
Start Temp 18°C
Sky 2
Wind 2
End Time 7:48
End Temp 24°C

Rows 75 Degrees ENE

Scale

1 in. = 50 m
1 cm = 20 m



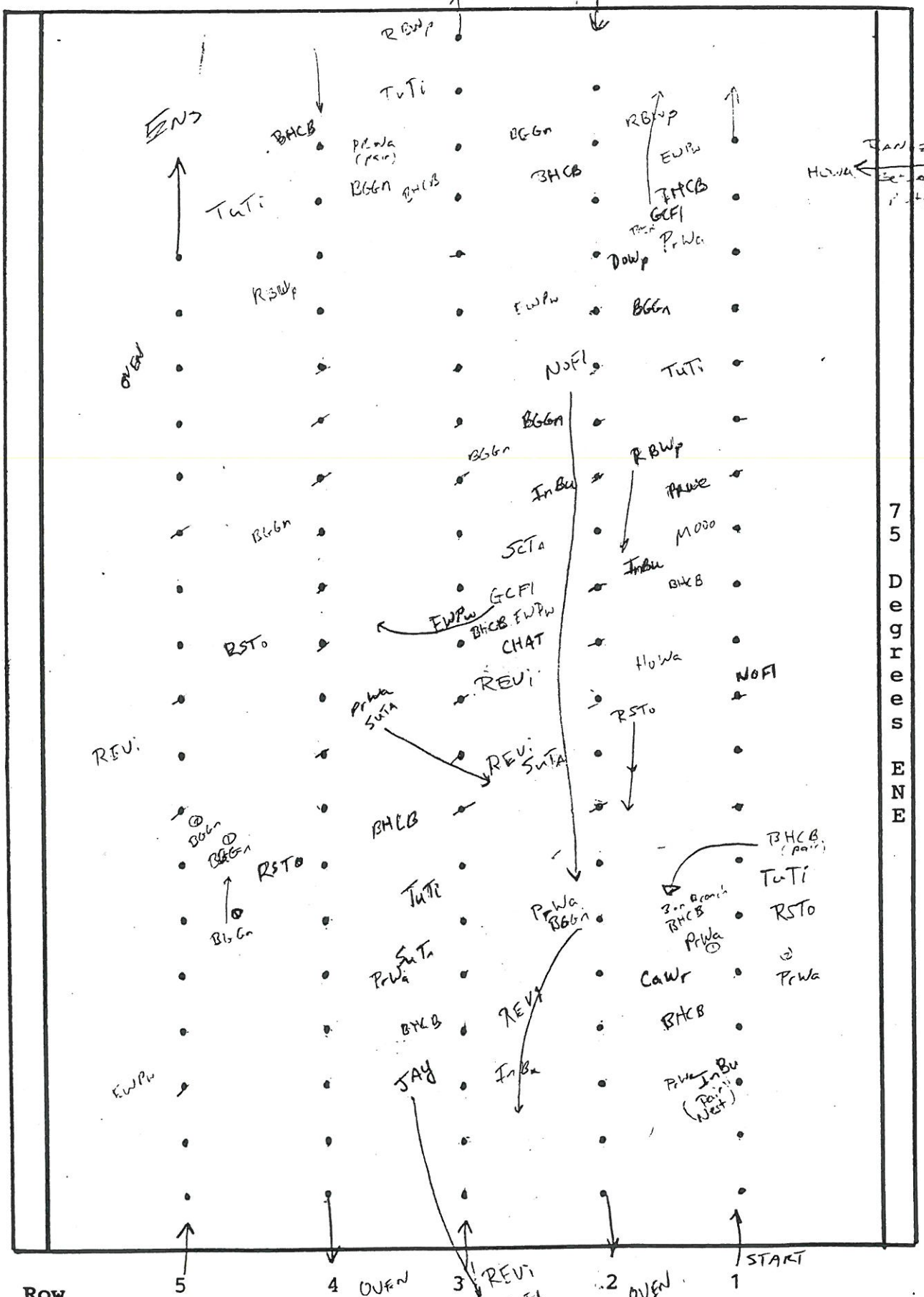
Observer Sally & Patrick
Date 5-23-99
Start Time 6:15
Start Temp 17°C
Sky 0
Wind 5

End Time 9:00AM
End Temp 25°C

Scale

1 in. = 50 m
1 cm = 20 m

Plot 2



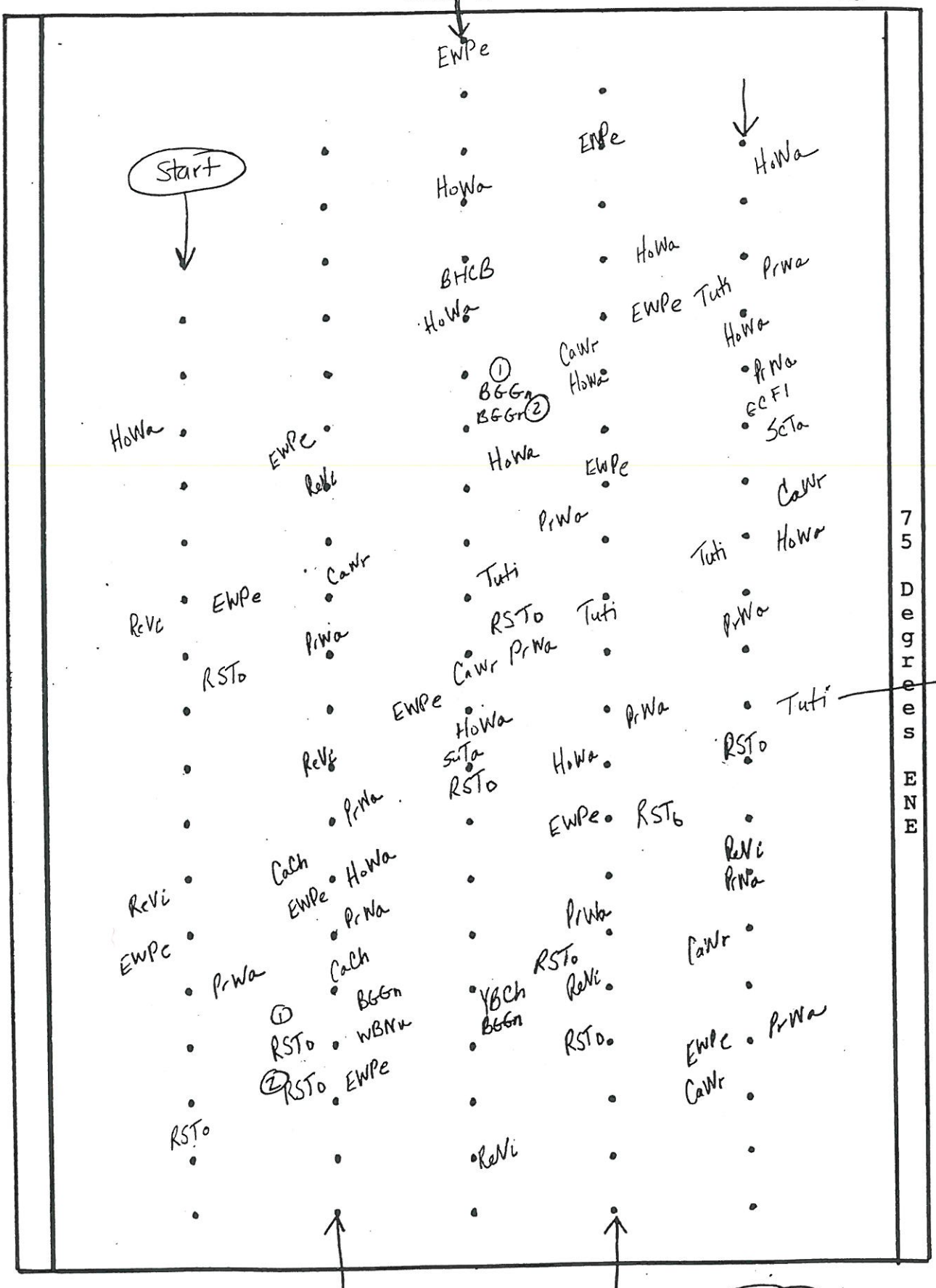
Row

Observer Patrick
Date 5/26/99
Start Time 6:23
Start Temp 11°C
Sky 1
Wind 2

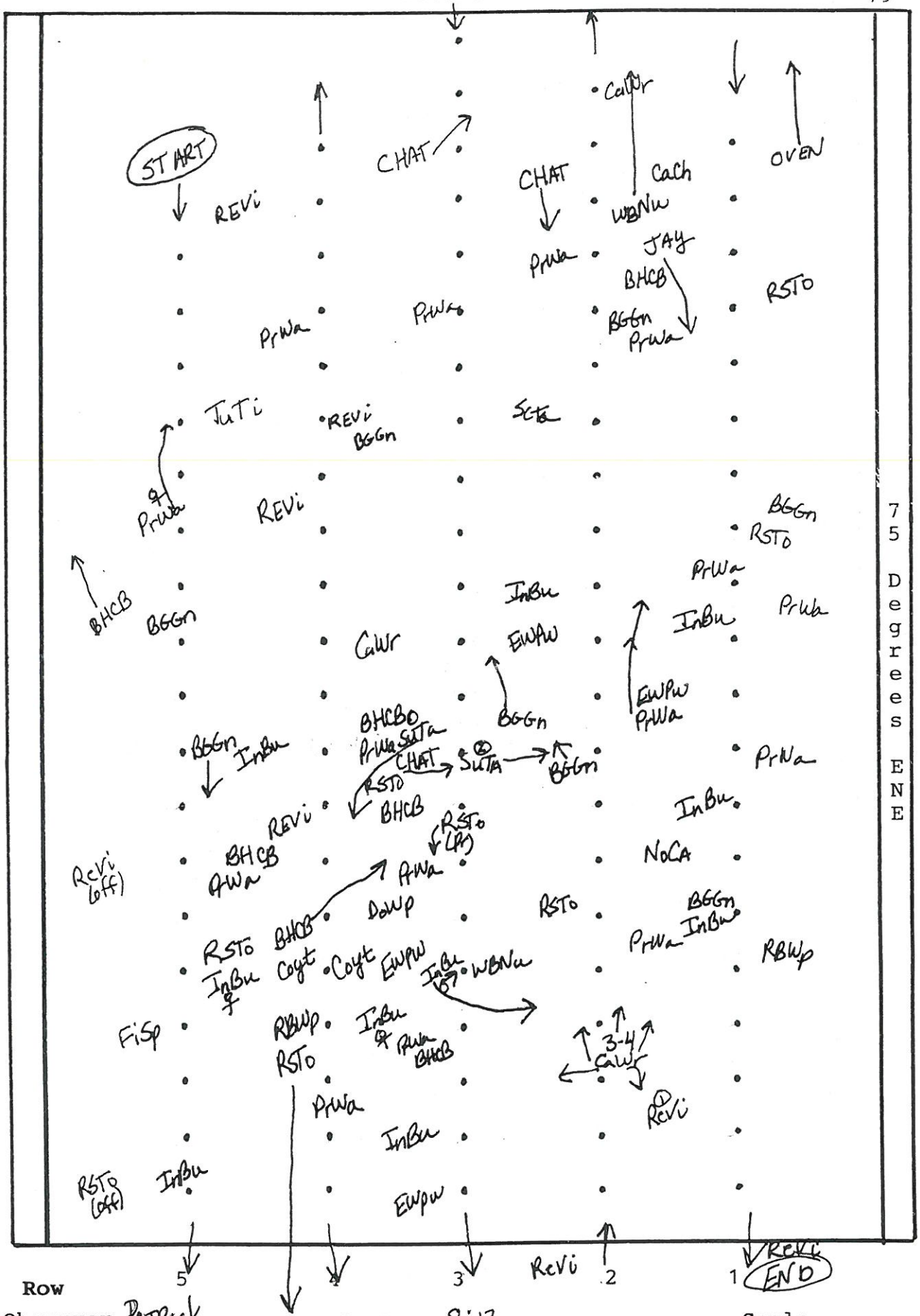
End Time 5:35
End Temp 18°C

Scale

1 in. = 50 m
1 cm = 20 m


Start
EWPe
HoWa
BHCB
HoWa
EWPe
HoWa
EWPe
HoWa
Tutk
PrWa
HoWa
PrWa
GCFl
SCTa
CaWr
HoWa
Tuti
PrWa
Tuti
RSTo
PrWa
RSTo
PrWa
Tuti
RSTo
RSTo
EWPe
CaWr
PrWa
HoWa
SuTa
RSTo
RSTo
EWPe
RSTo
ReVi
PrWa
ReVi
PrWa
CaCh
EWPe
HoWa
PrWa
EWPe
PrWa
CaCh
BGGn
WBNu
RSTo
EWPe
RSTo
YBCh
BGGn
ReVi
RSTo
EWPe
PrWa
CaWr
RSTo
ReVi
CaWr
RSTo
75 Degrees ENE
Row
5
4
3
2
OVEN
1
Observer Sally
Date 5/29/99
Start Time 10:30 AM
Start Temp 12°C
Sky 0
Wind 1
End Time 8:48 AM
End Temp 30°C
Scale
1 in. = 50 m
1 cm = 20 m

MoDo
BoWh



Row

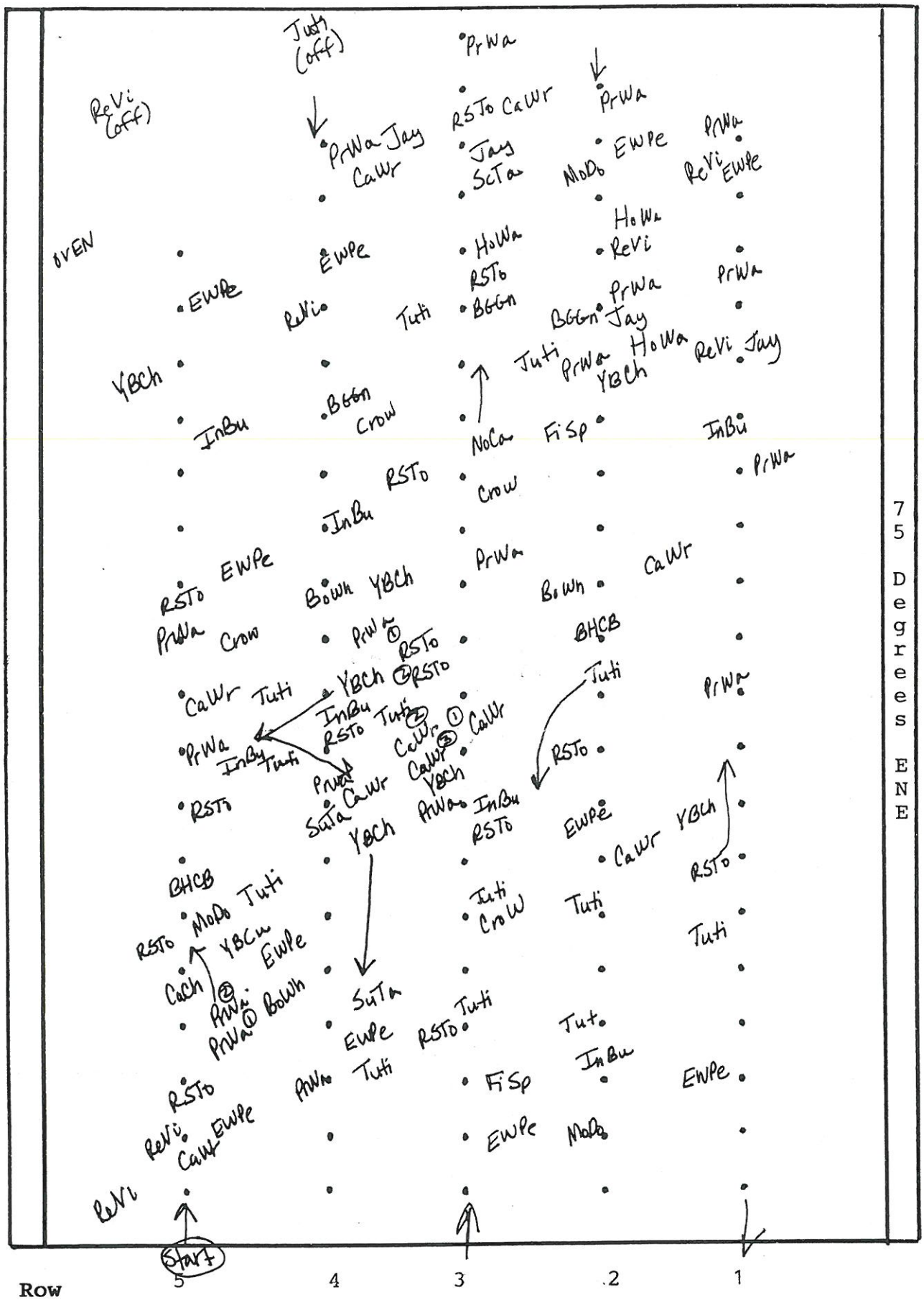
Observer PATRICK
Date 6-8-99
Start Time 6:15AM
Start Temp 20°C
Sky 0
Wind 2

End Time 8:13
End Temp 29°C

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2

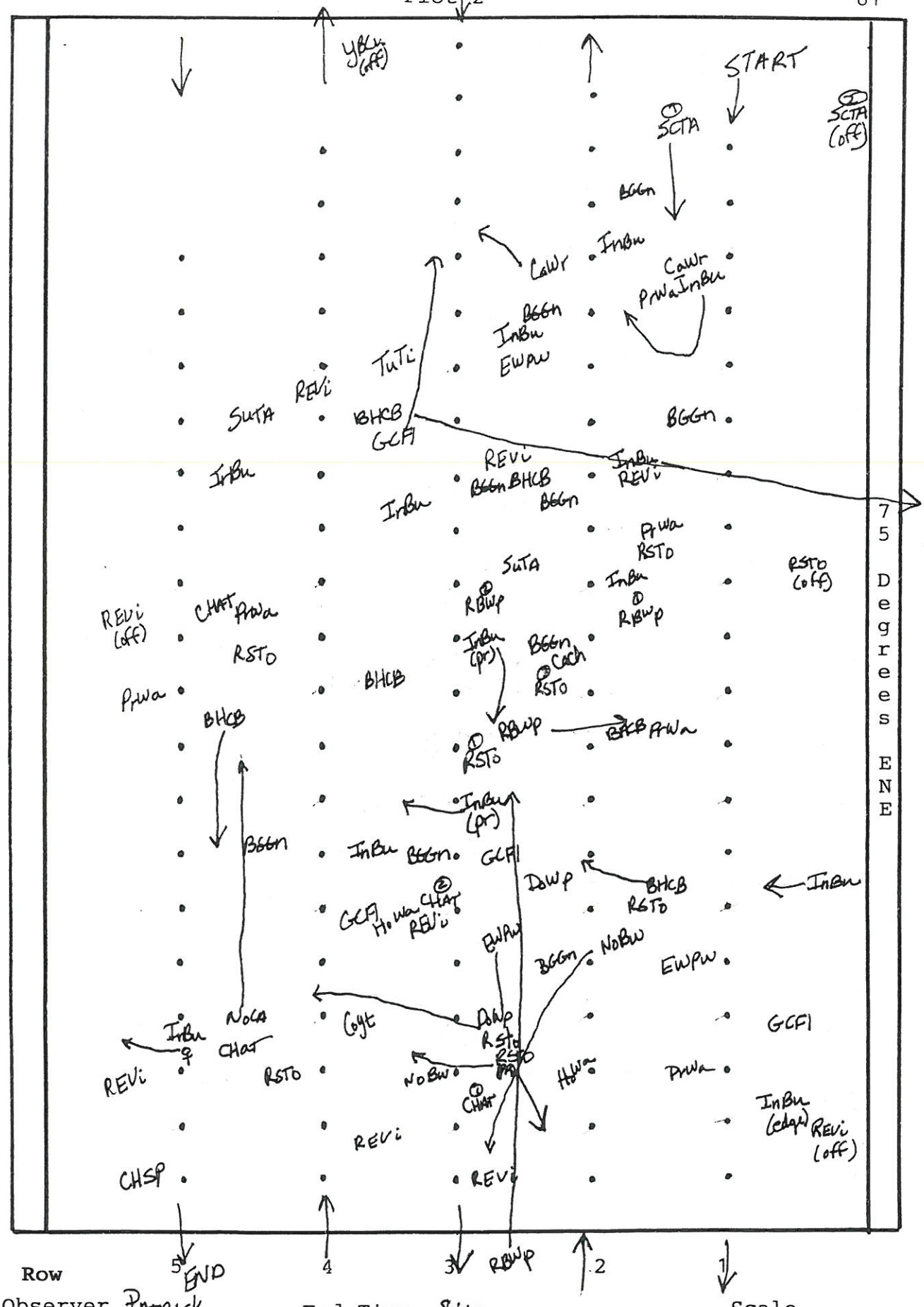


Observer Sally
Date 6/14/99
Start Time 6:05 AM
Start Temp 15°C
Sky

End Time 8:10 AM
End Temp 27°C
Wind

Scale

1 in. = 50 m
1 cm = 20 m



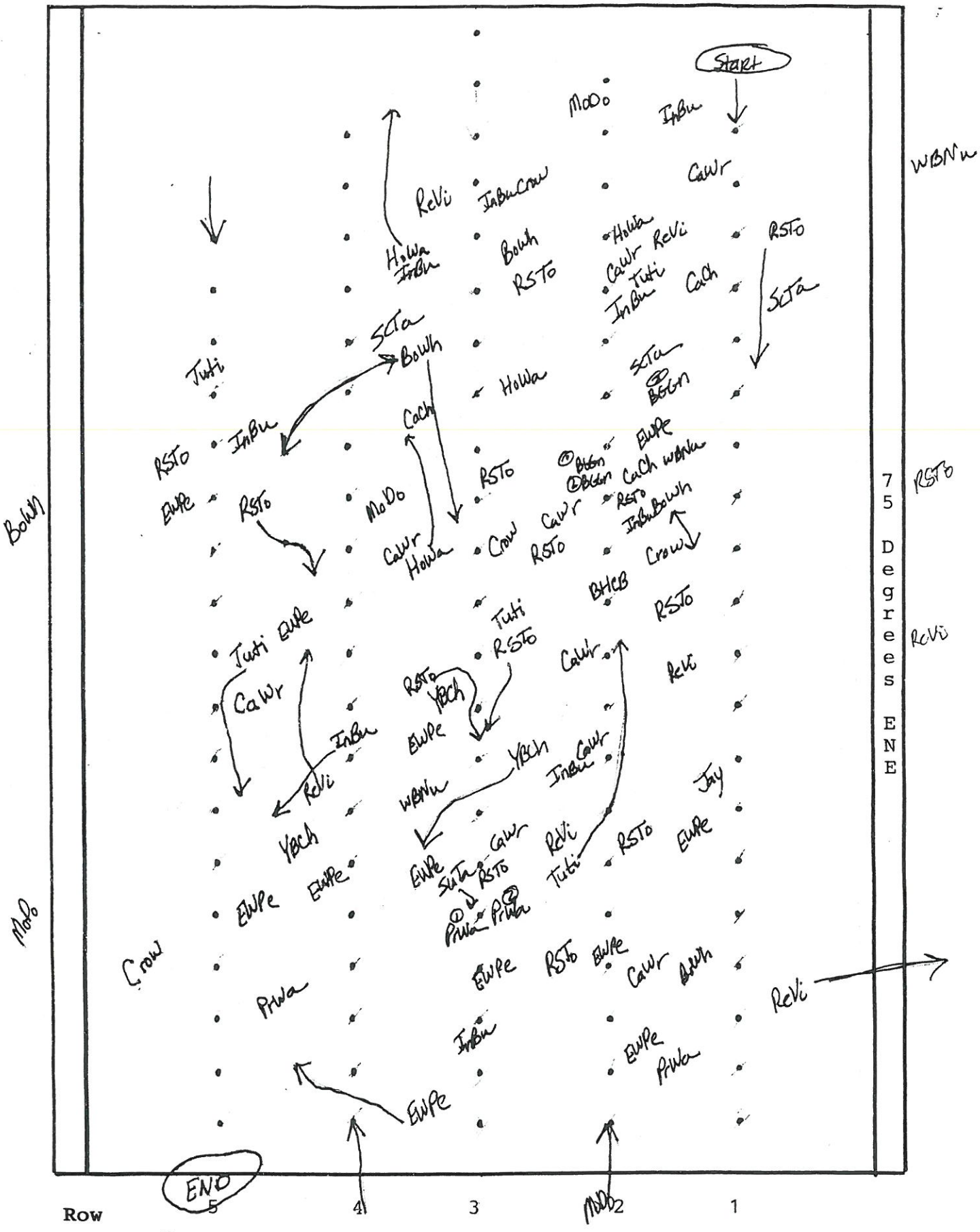
Row

Observer Patrick
Date 6-23-99
Start Time 6:10
Start Temp 11°C
Sky ○
Wind |

End Time 8:10
End Temp 22°C

Scale

1 in. = 50 m
1 cm = 20 m

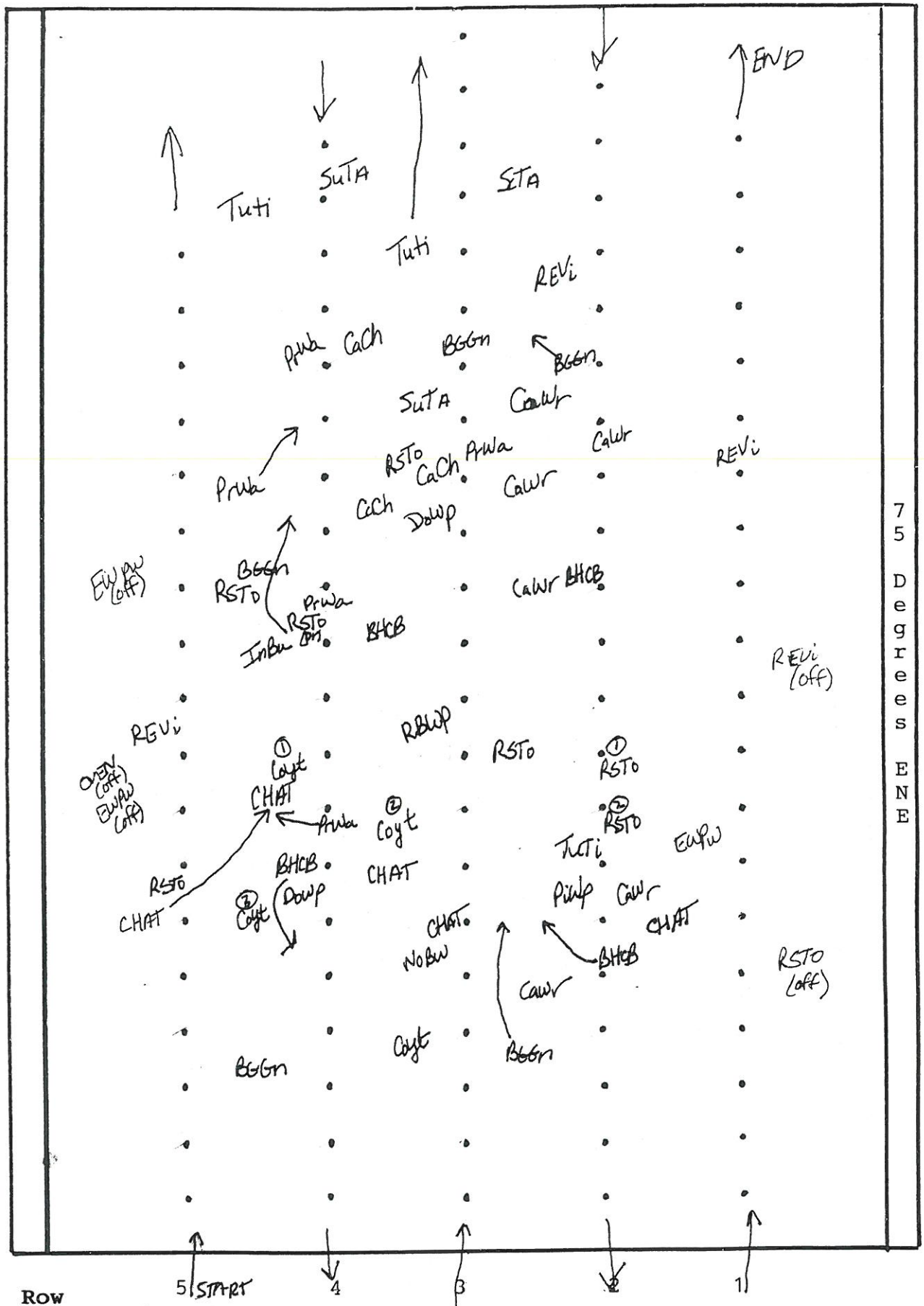


Observer Sally
Date 6/25/99
Start Time 6:15 AM
Start Temp 20°C
Sky 3
Wind 1

End Time 7:55 AM
End Temp 25°C

Scale

1 in. = 50 m
1 cm = 20 m



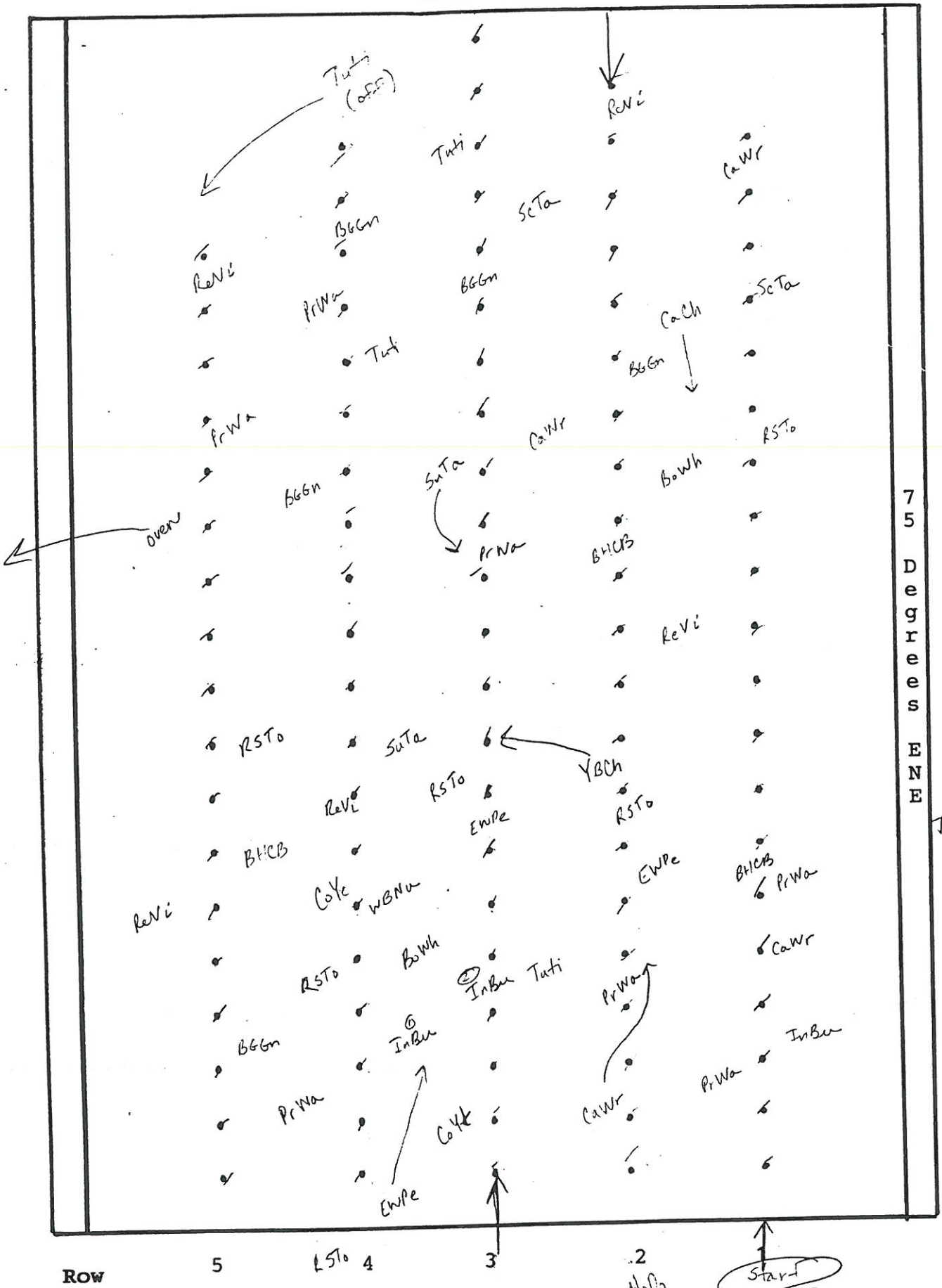
Row

Observer PATRICK
Date 6/28/99
Start Time 6:30
Start Temp 23°C
Sky 2
Wind 2

End Time 8:05
End Temp 29°C

Scale

1 in. = 50 m
1 cm = 20 m



Observer Sally
Date 7/2/99
Start Time 6:15AM
Start Temp 18°C
Sky 2
Wind

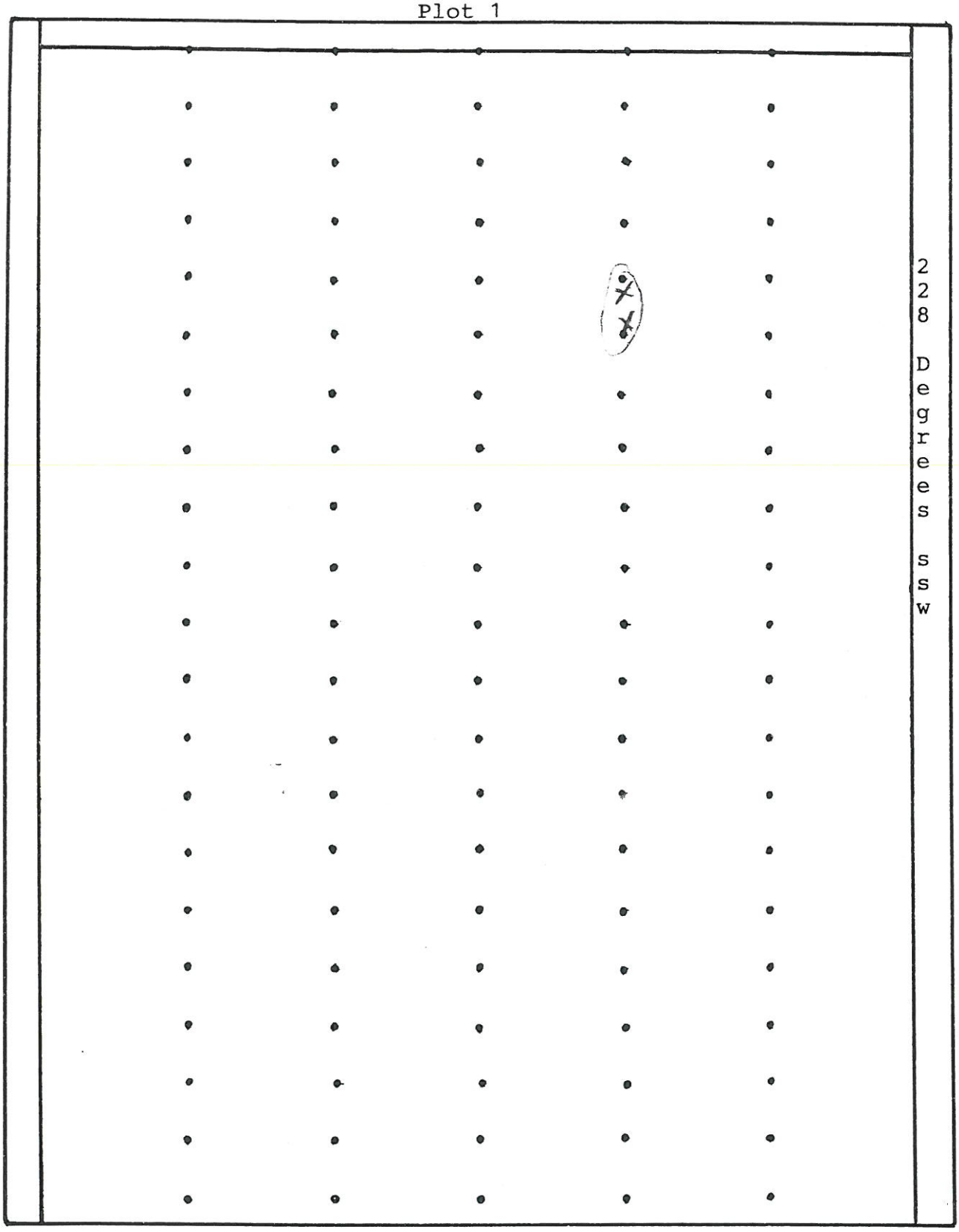
End Time 8:15 AM
End Temp 26°C

1 in. = 50 m
1 cm = 20 m

Appendix III

This appendix contains copies of the territory maps. To determine territories of the breeding birds territory maps were drawn and analyzed. All bird registrations from each plot were studied and transferred to make the territory maps. Each record of the bird species on the plot was then studied and circles drawn around the territories.

Kyanite
Plot 1

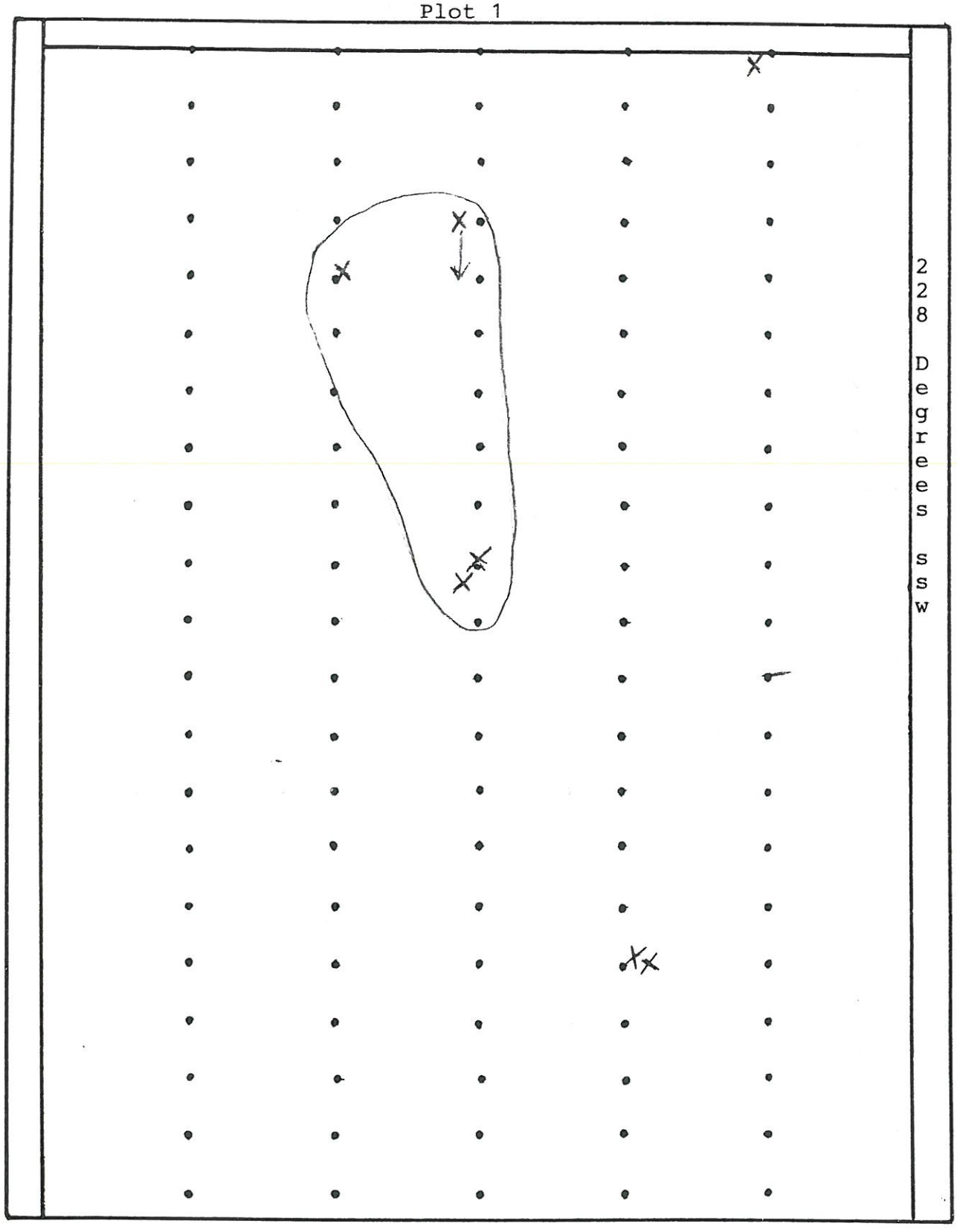


Yellow-billed Cuckoo

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

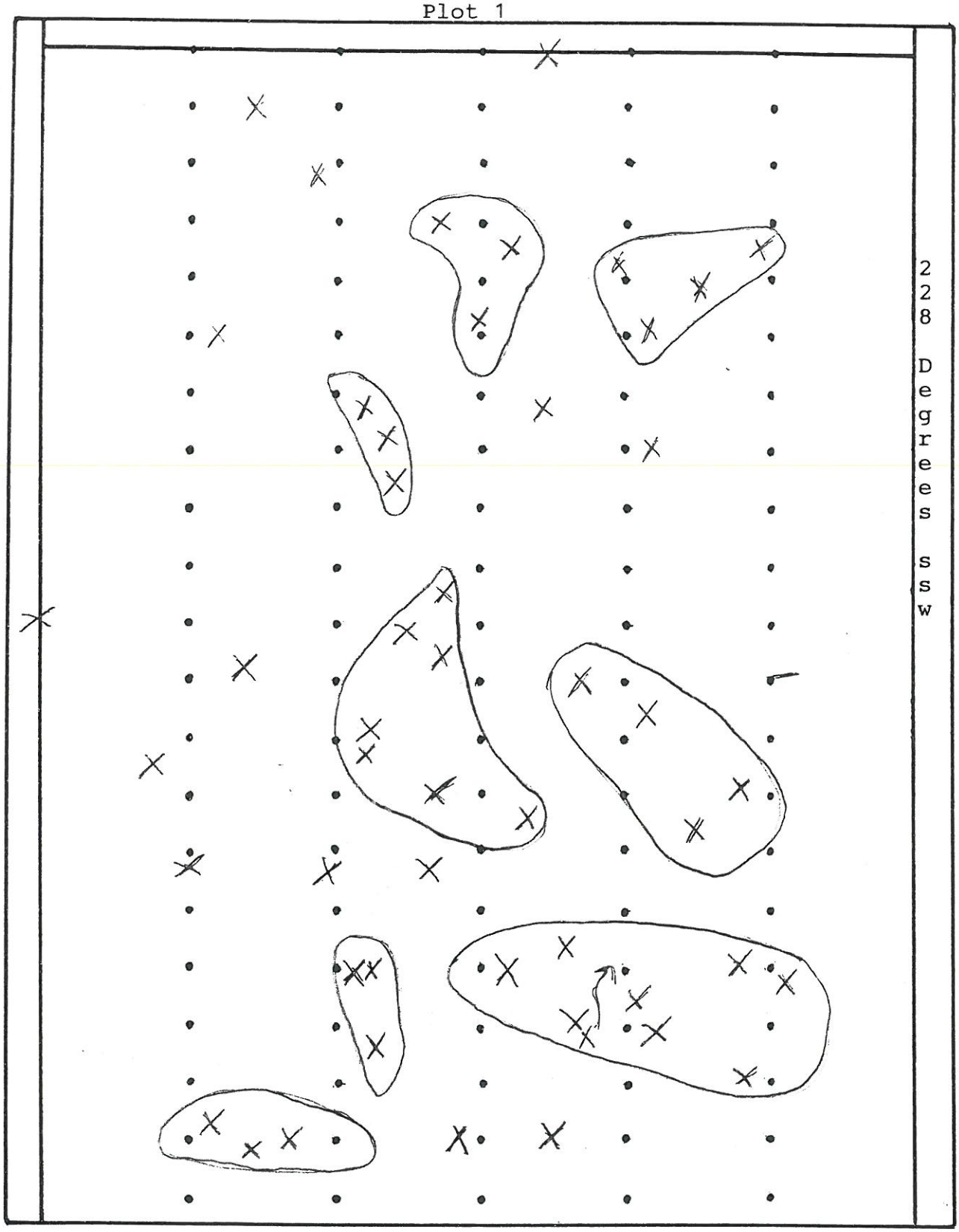


Great-Crested Flycatcher

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1



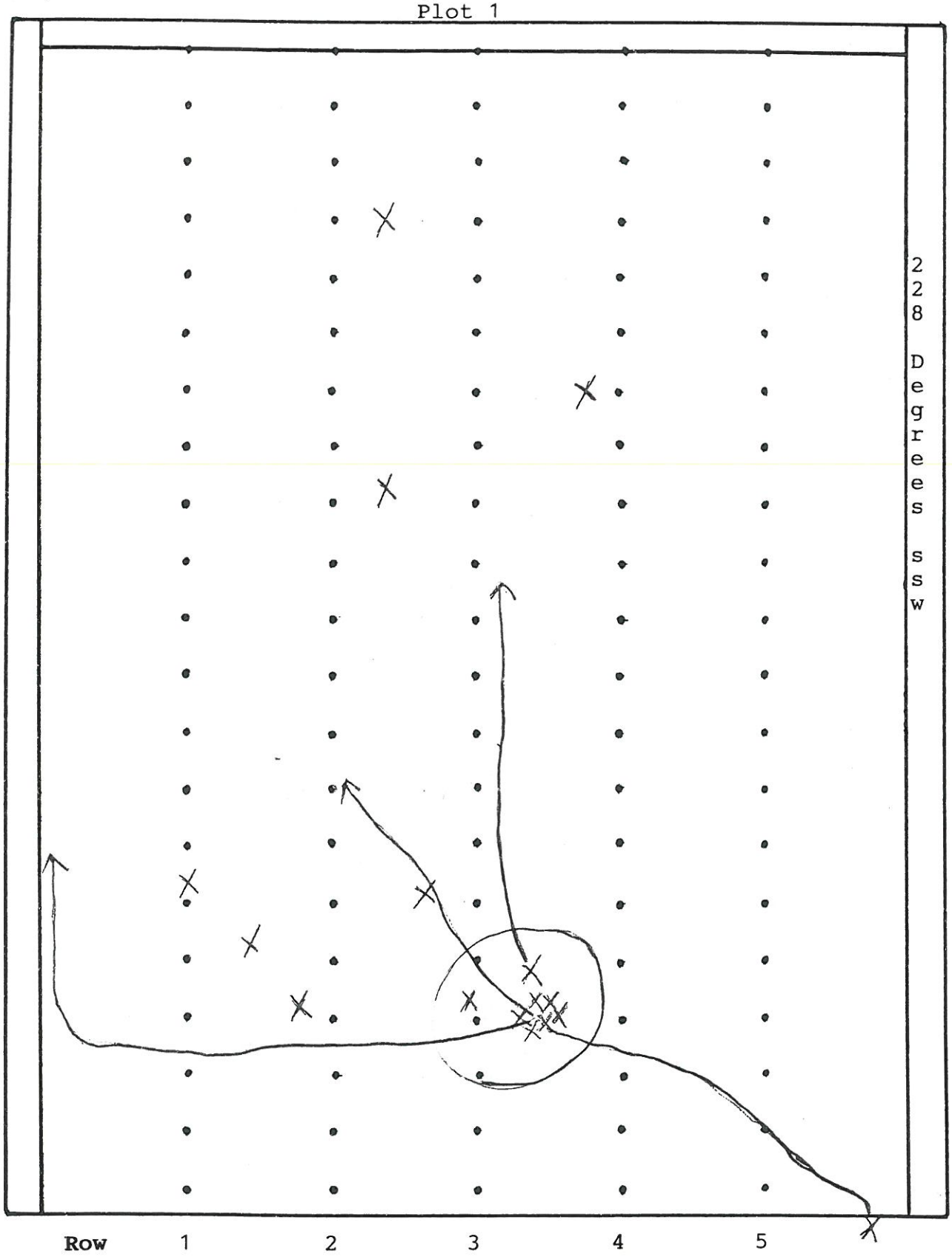
Row 1 2 3 4 5

Eastern Wood-Pewee

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

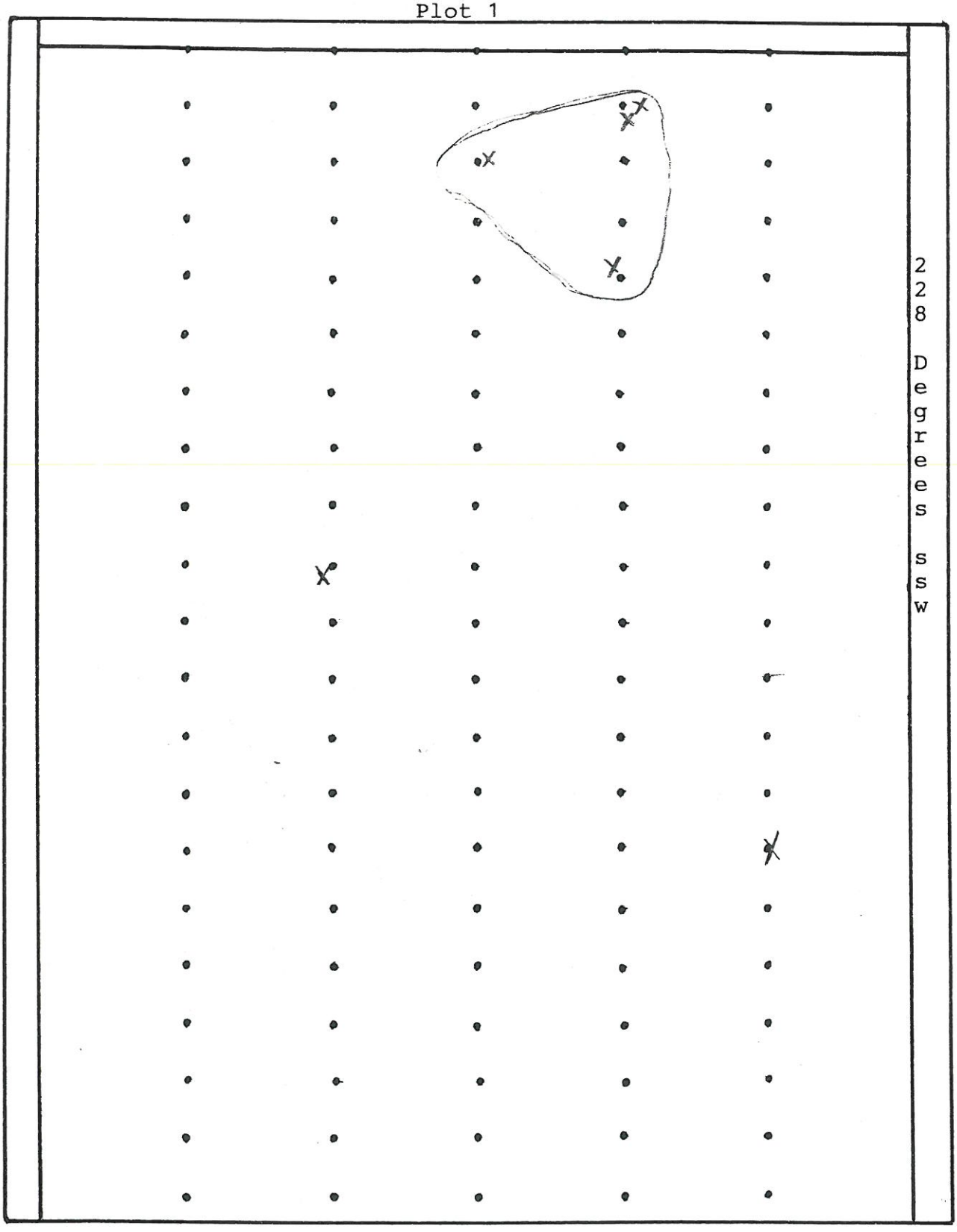


Blue Jay

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

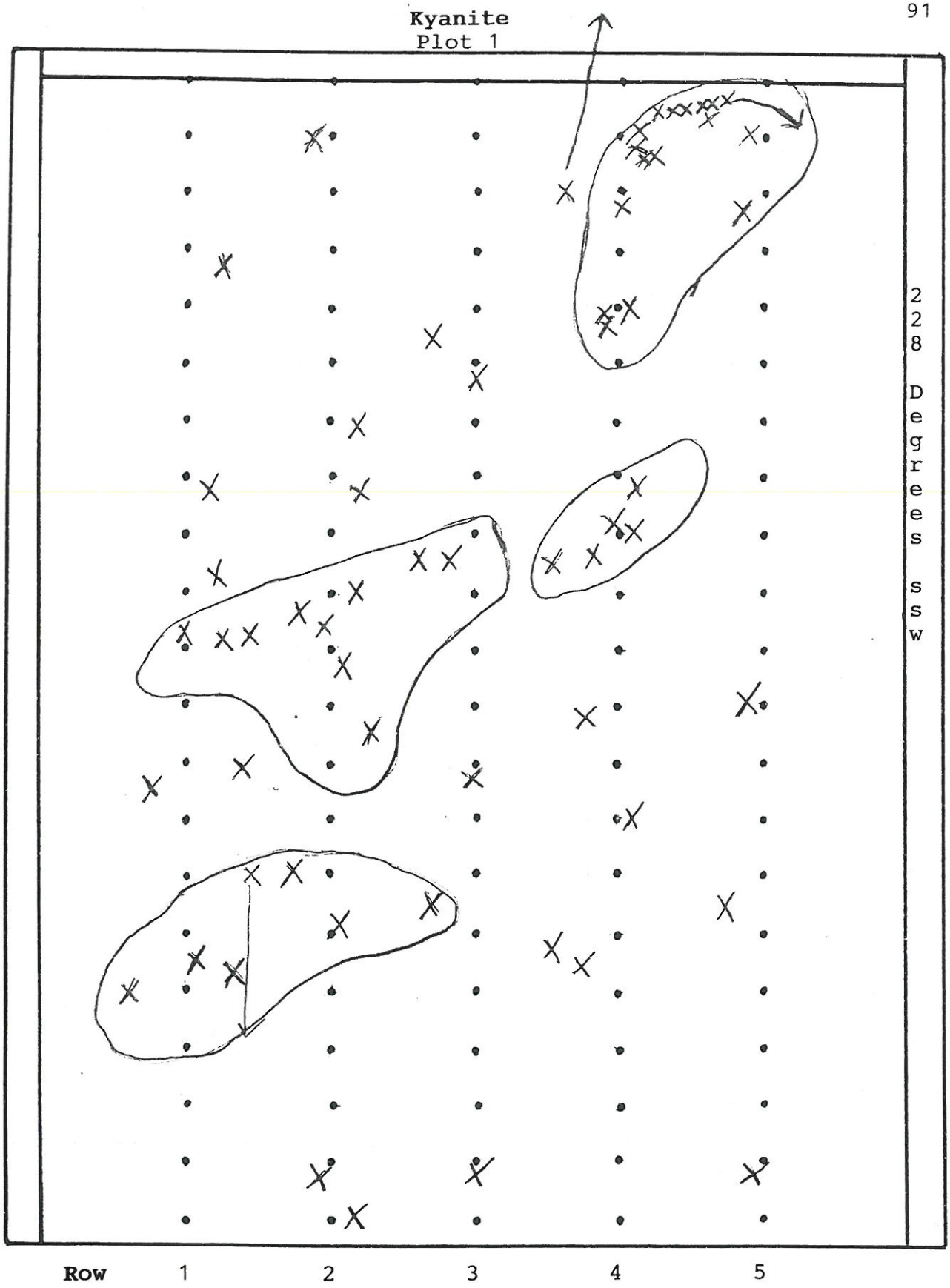


White-breasted Nuthatch

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

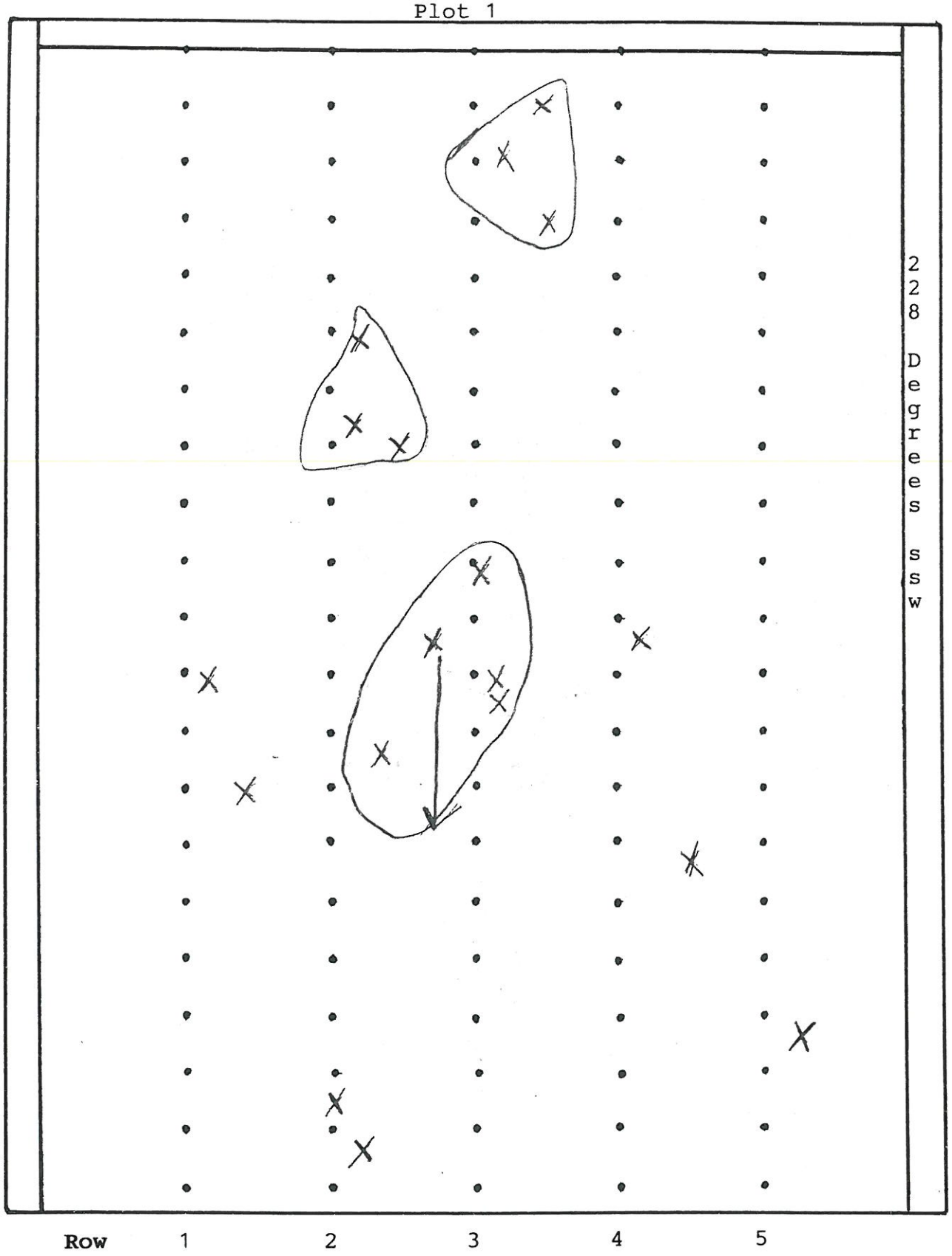


Carolina Wren

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

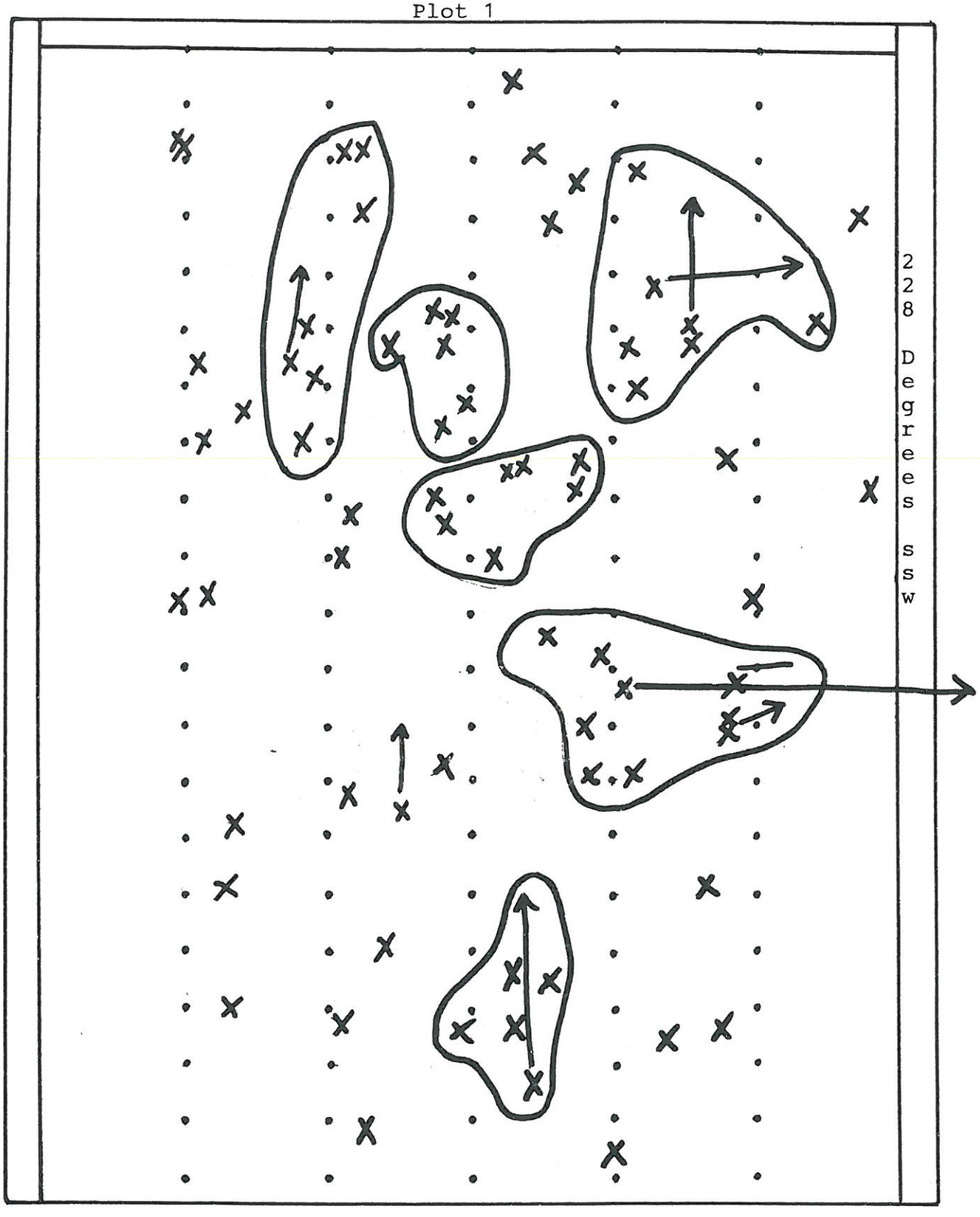


Blue-gray Gnatcatcher

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

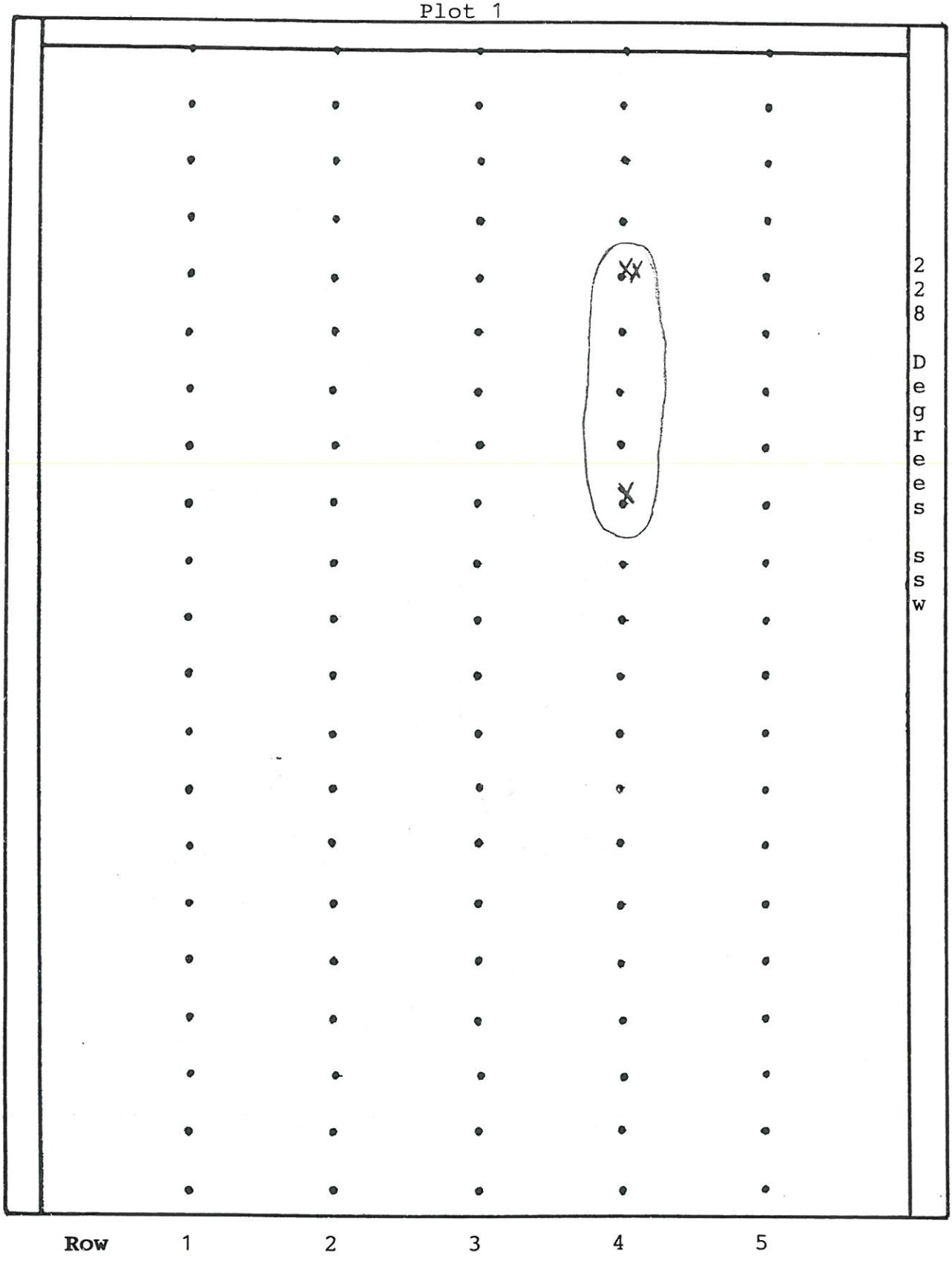


Red-Eyed Vireo

Scale

1 in. = 50 m
1 cm = 20 m

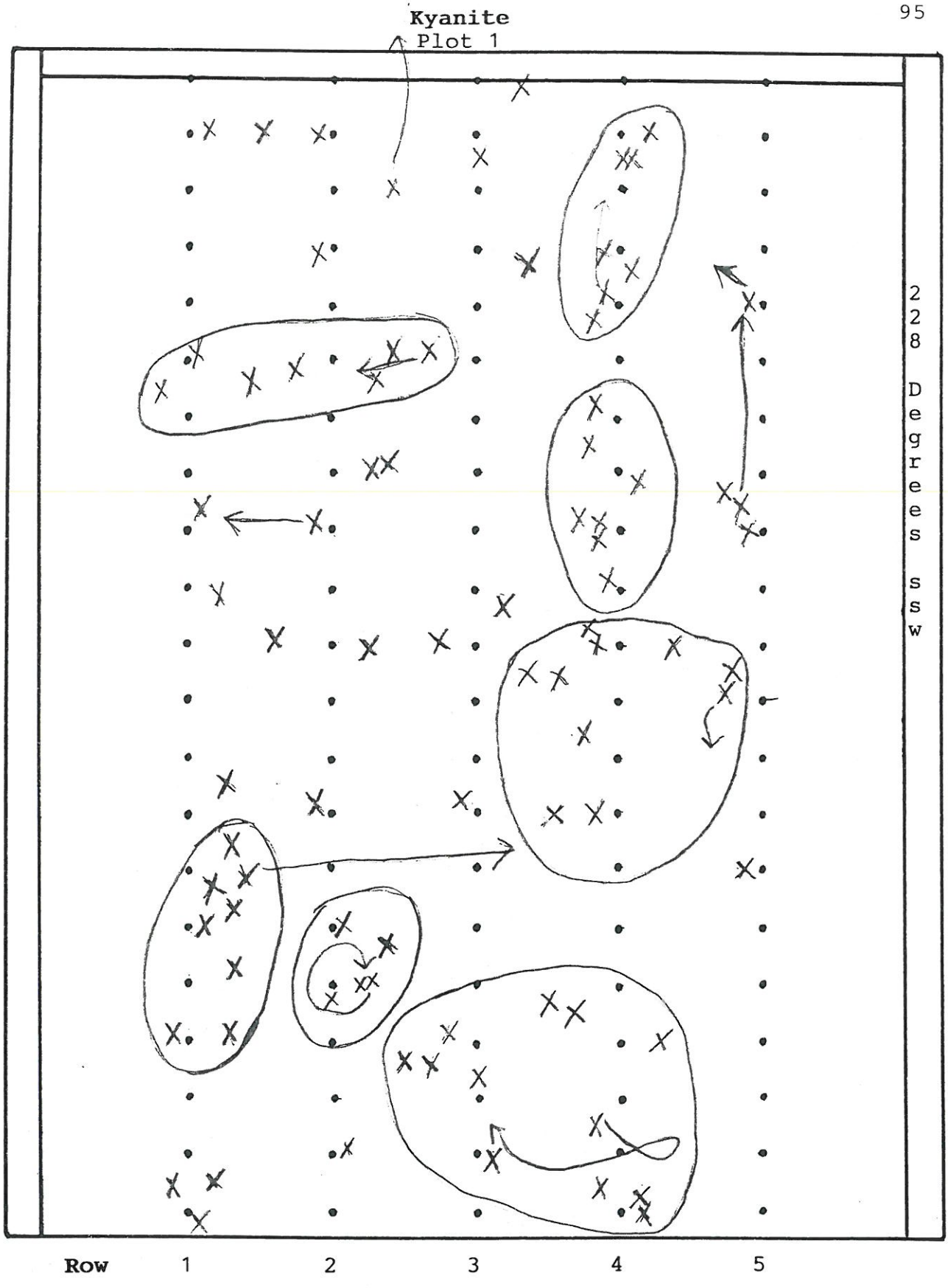
Kyanite
Plot 1



Common Yellowthroat

Scale

1 in. = 50 m
1 cm = 20 m

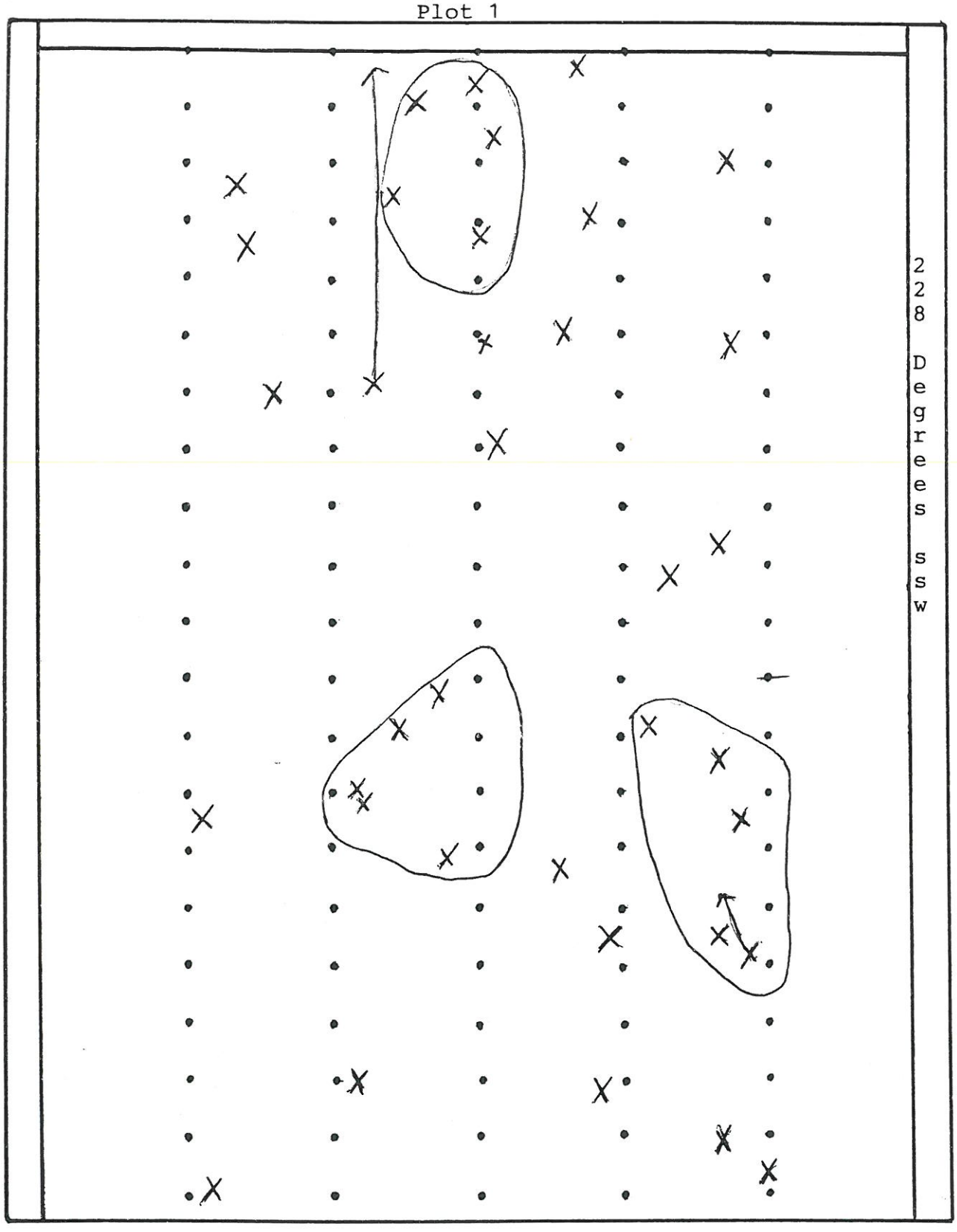


Indigo Bunting

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

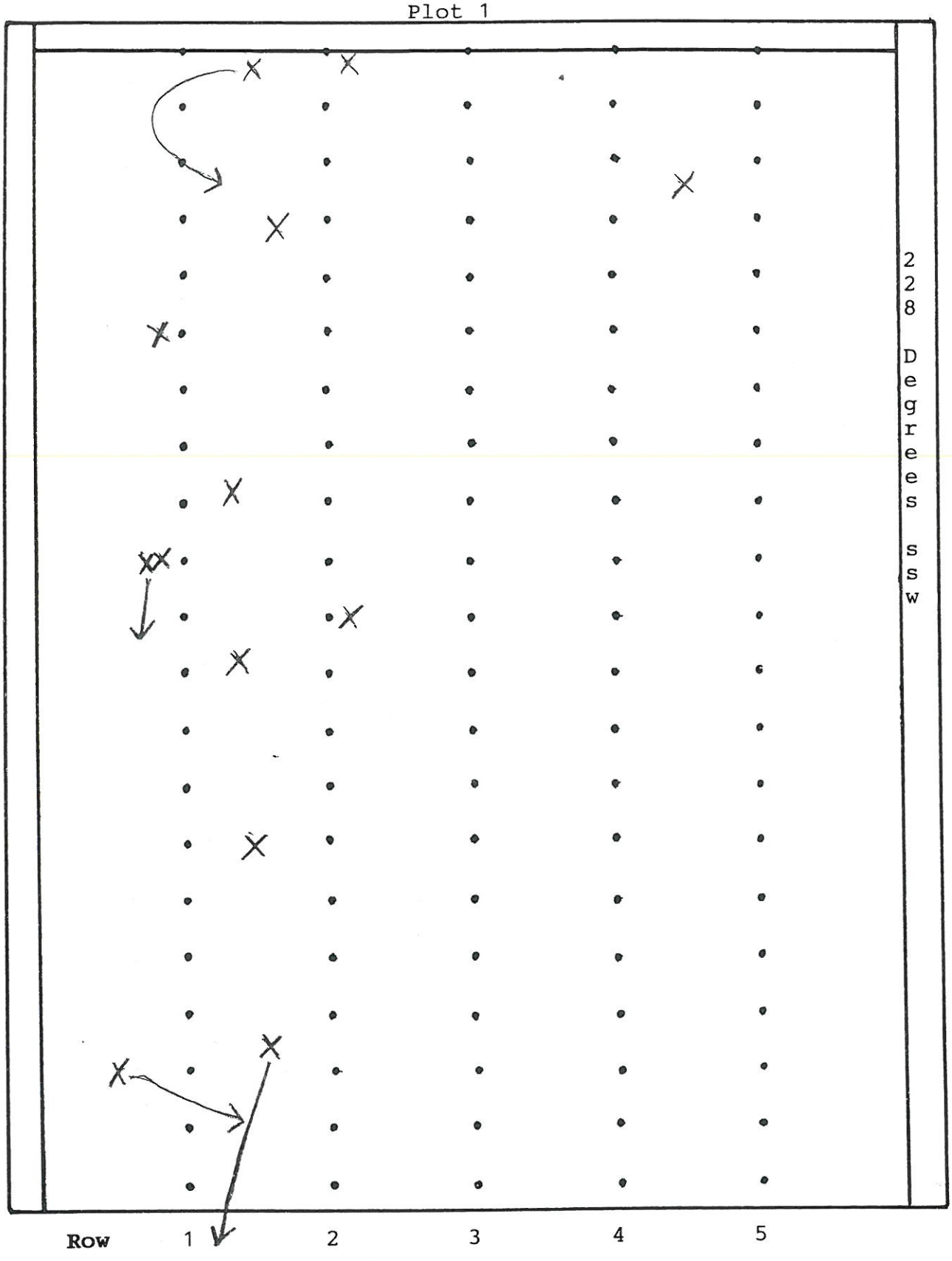


Rufous-sided Towhee

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1

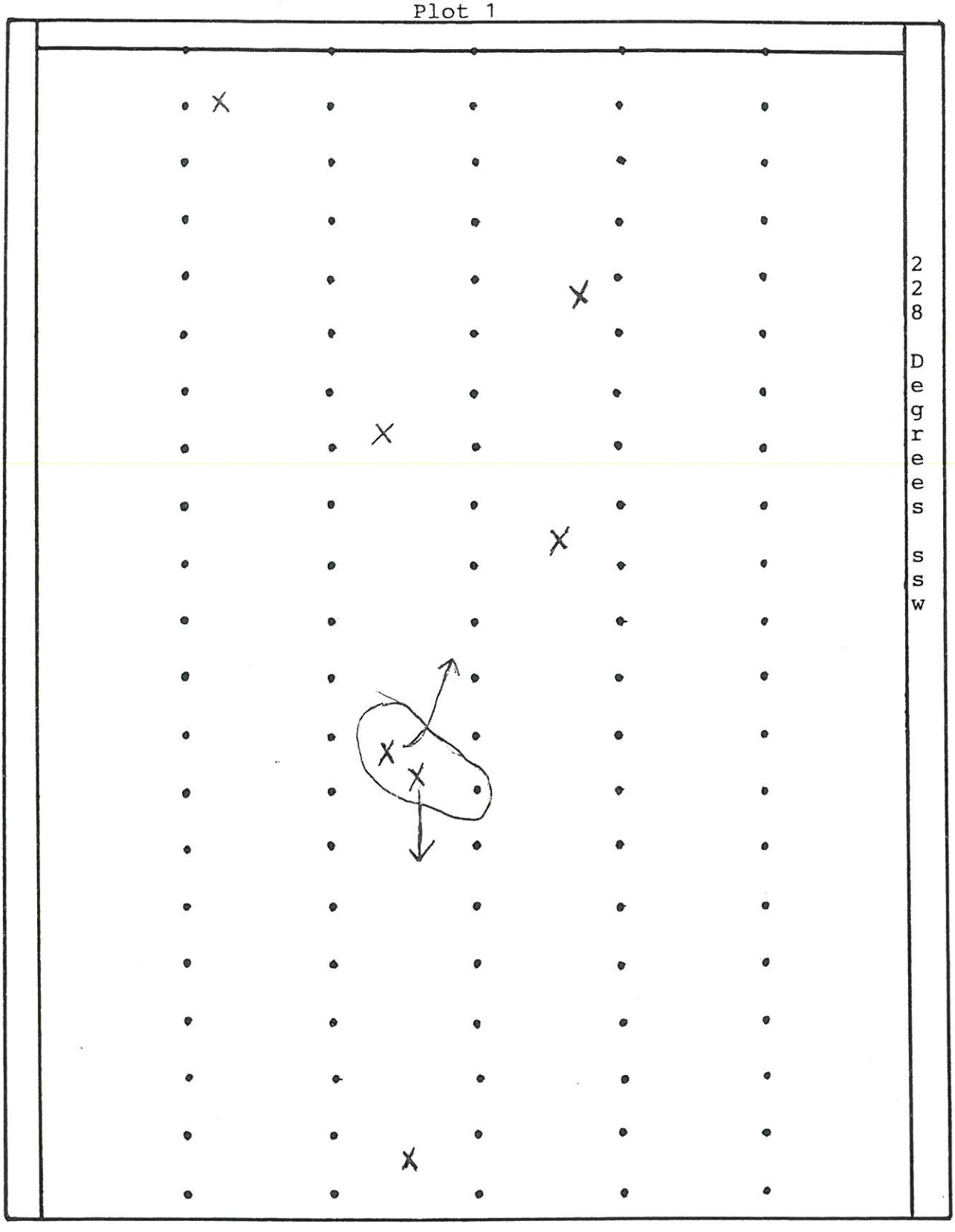


Brown-headed Cowbird

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1



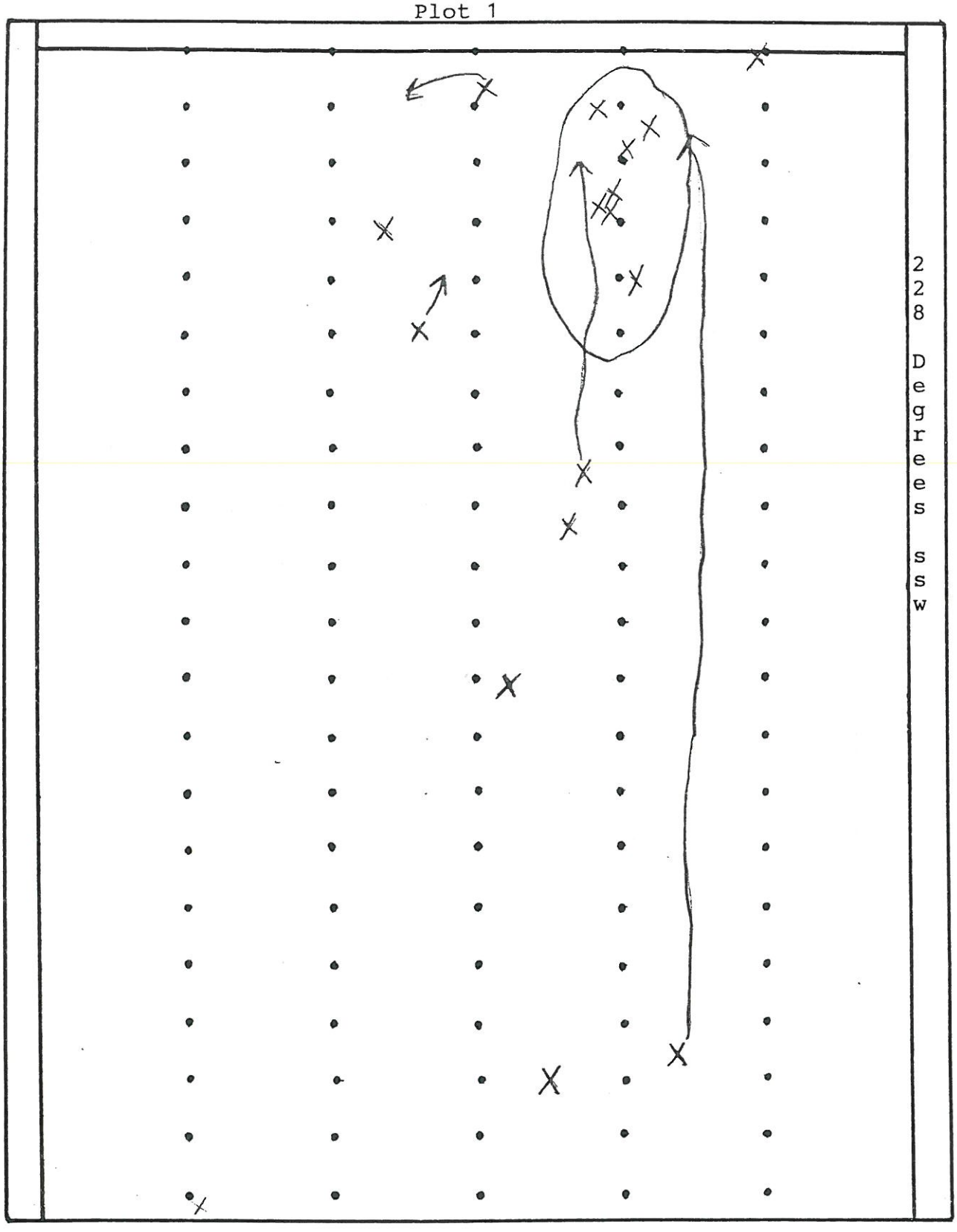
Row 1 2 3 4 5

Scarlet Tanager

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 1



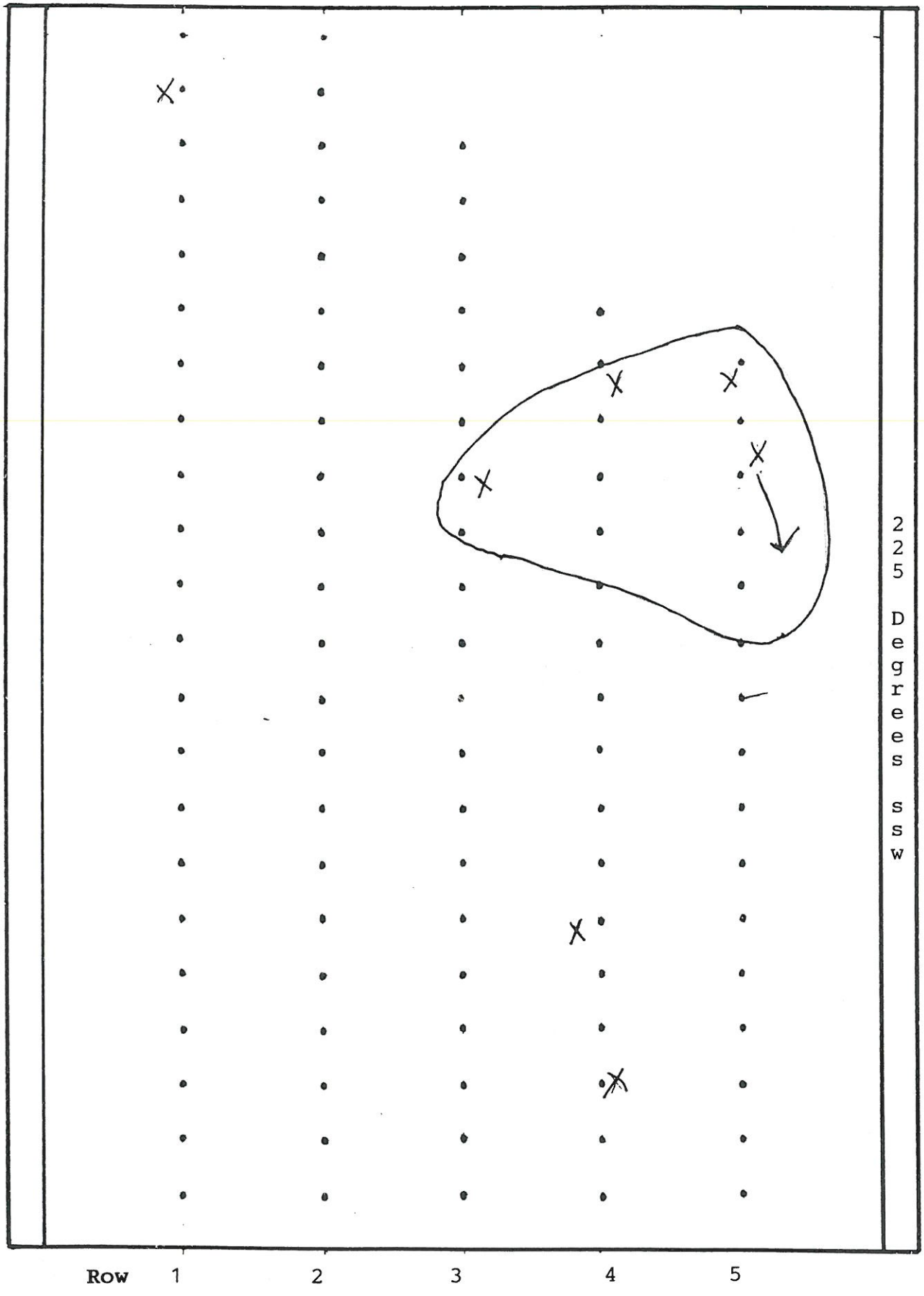
Row 1 2 3 4 5

Summer Tanager

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

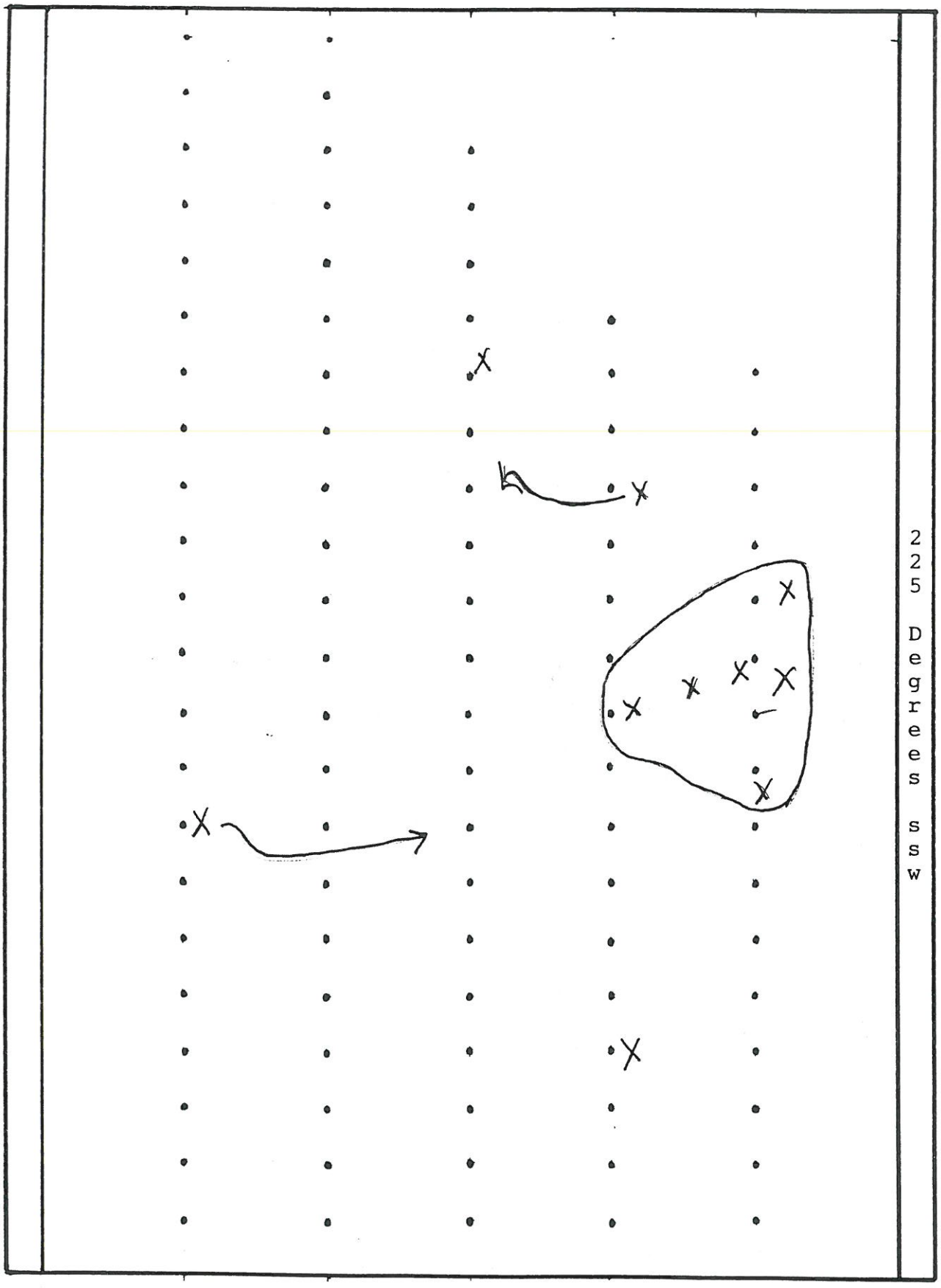


Red-bellied Woodpecker

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

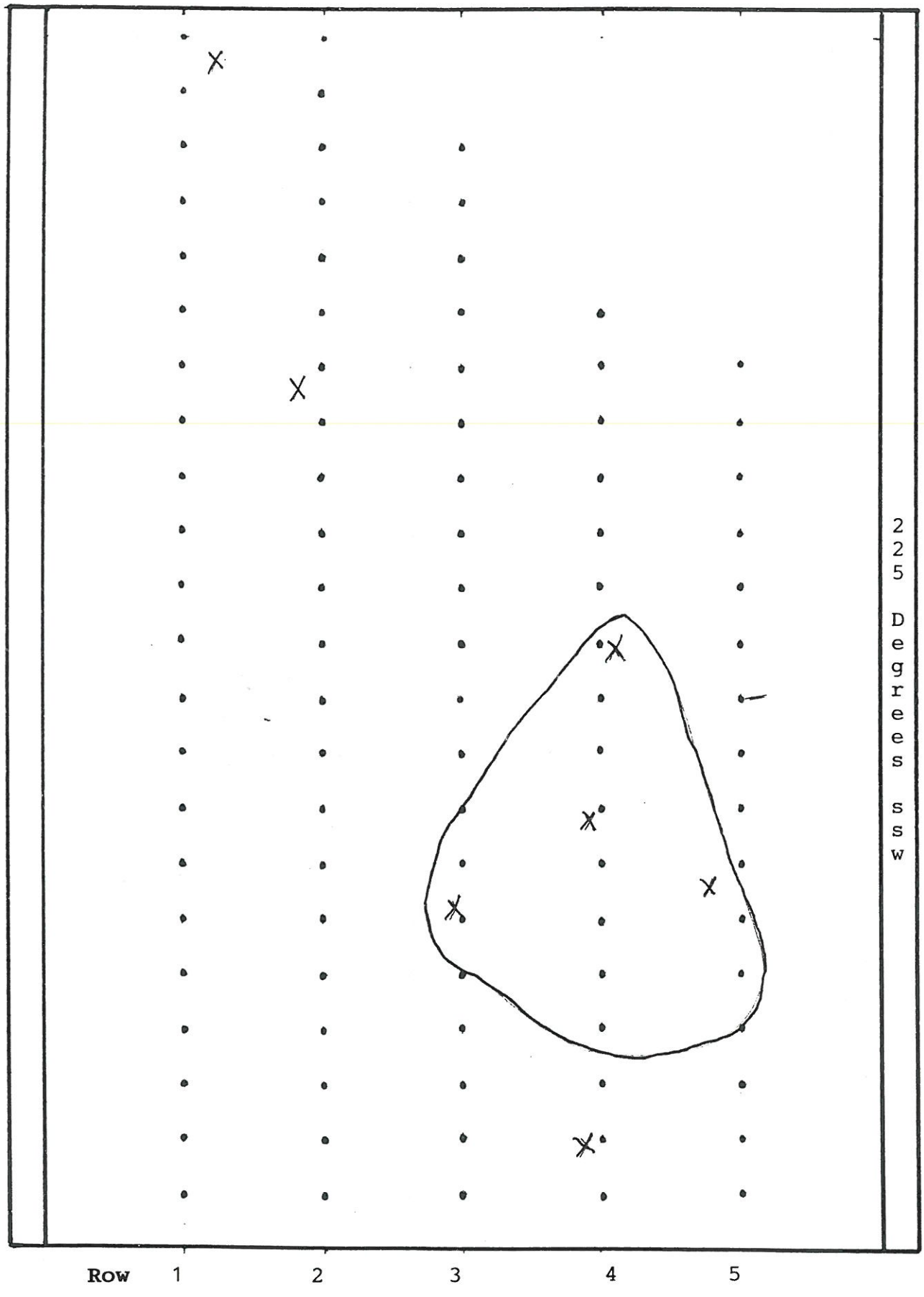


Red-headed Woodpecker

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2



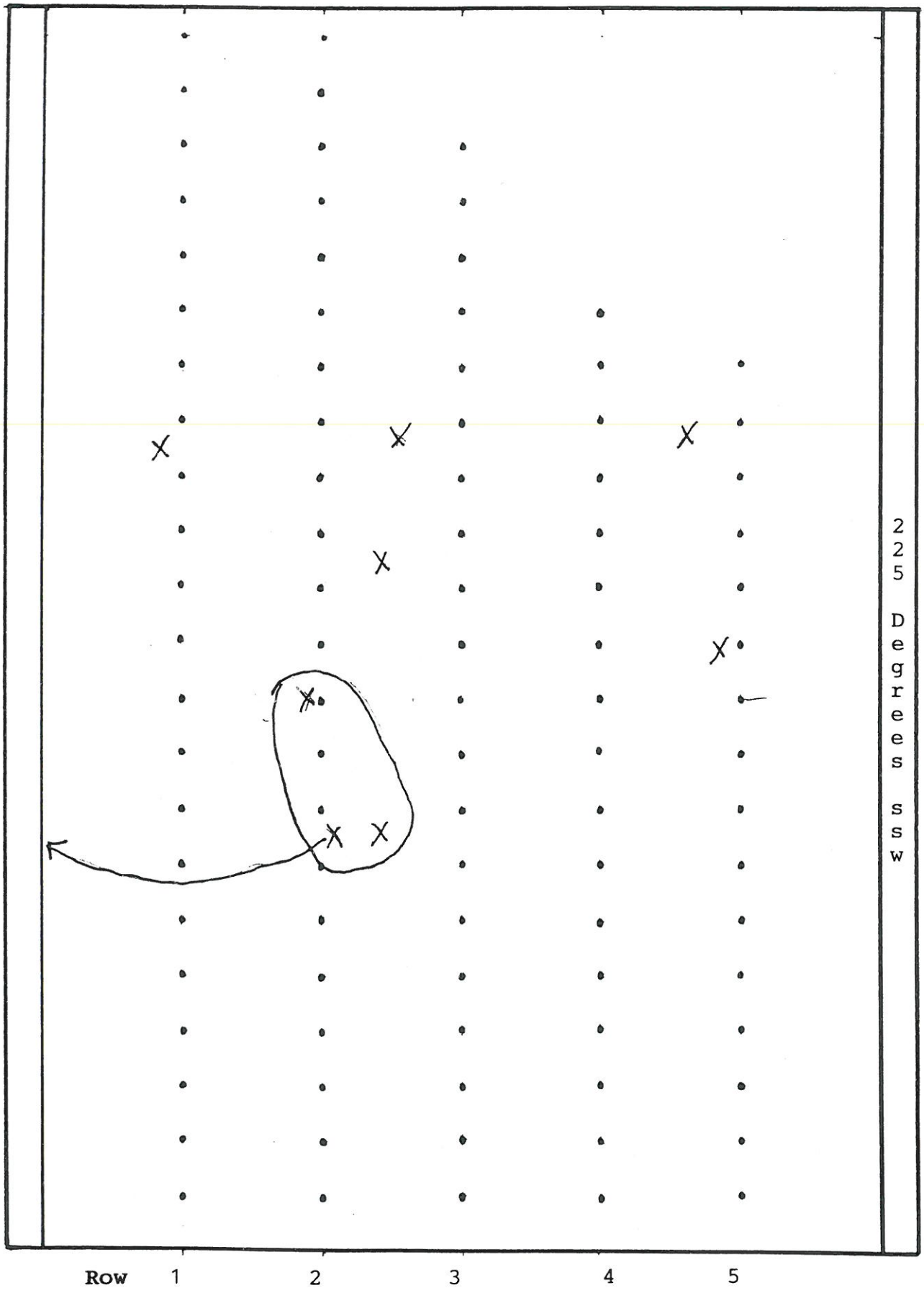
Downy Woodpecker

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

5103

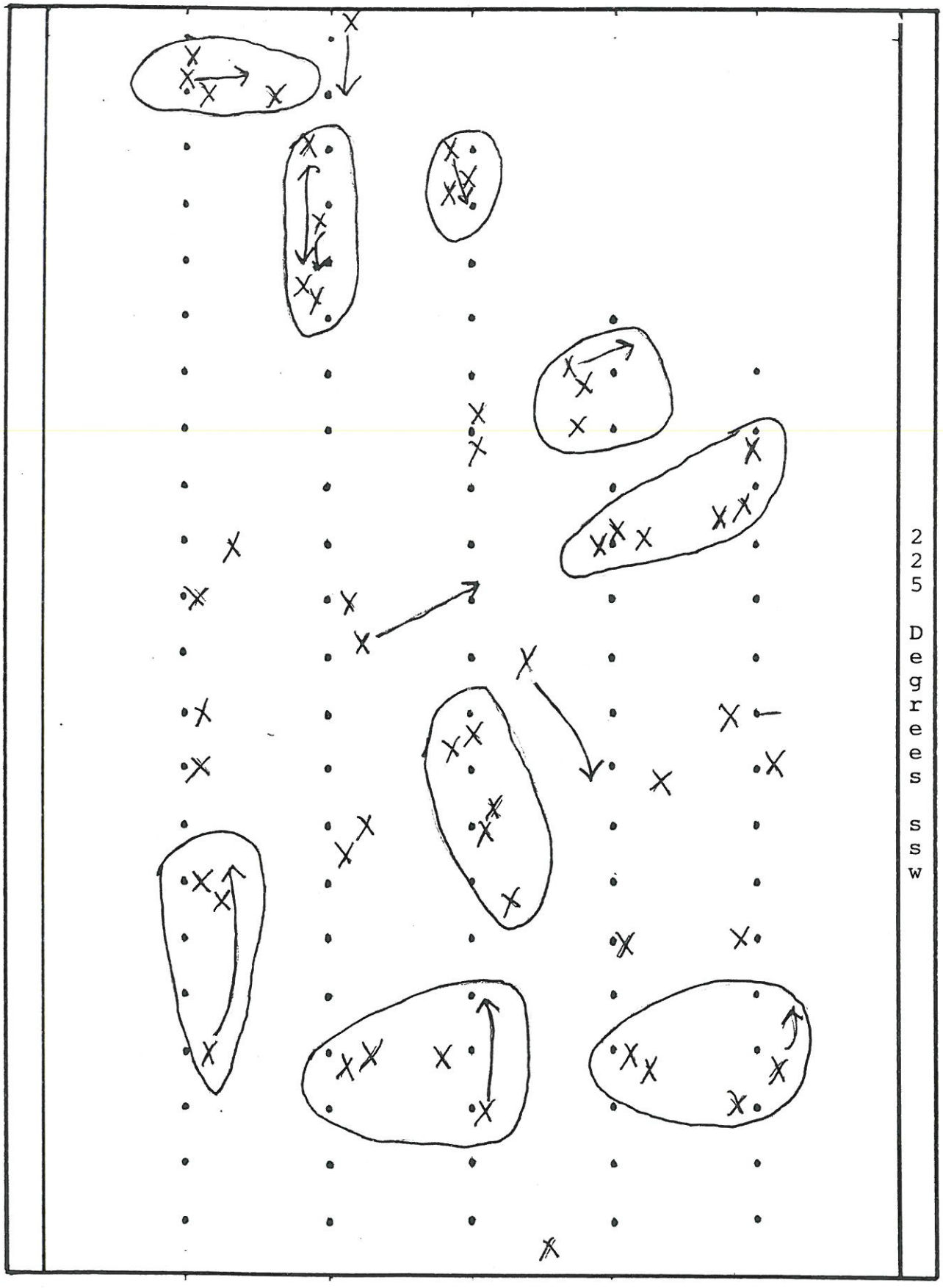


Great-Crested Flycatcher

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

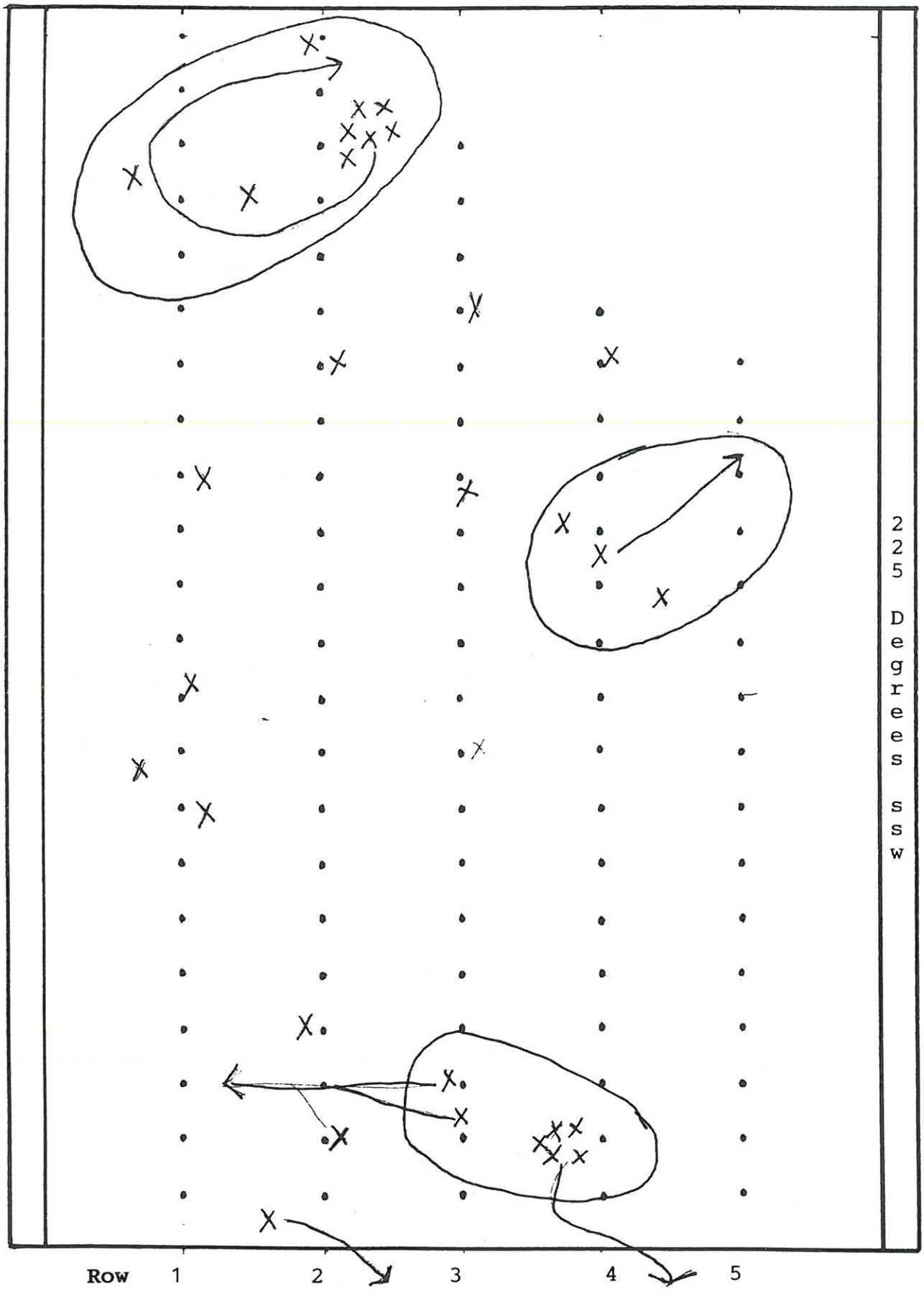


Eastern Wood-Pewee

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

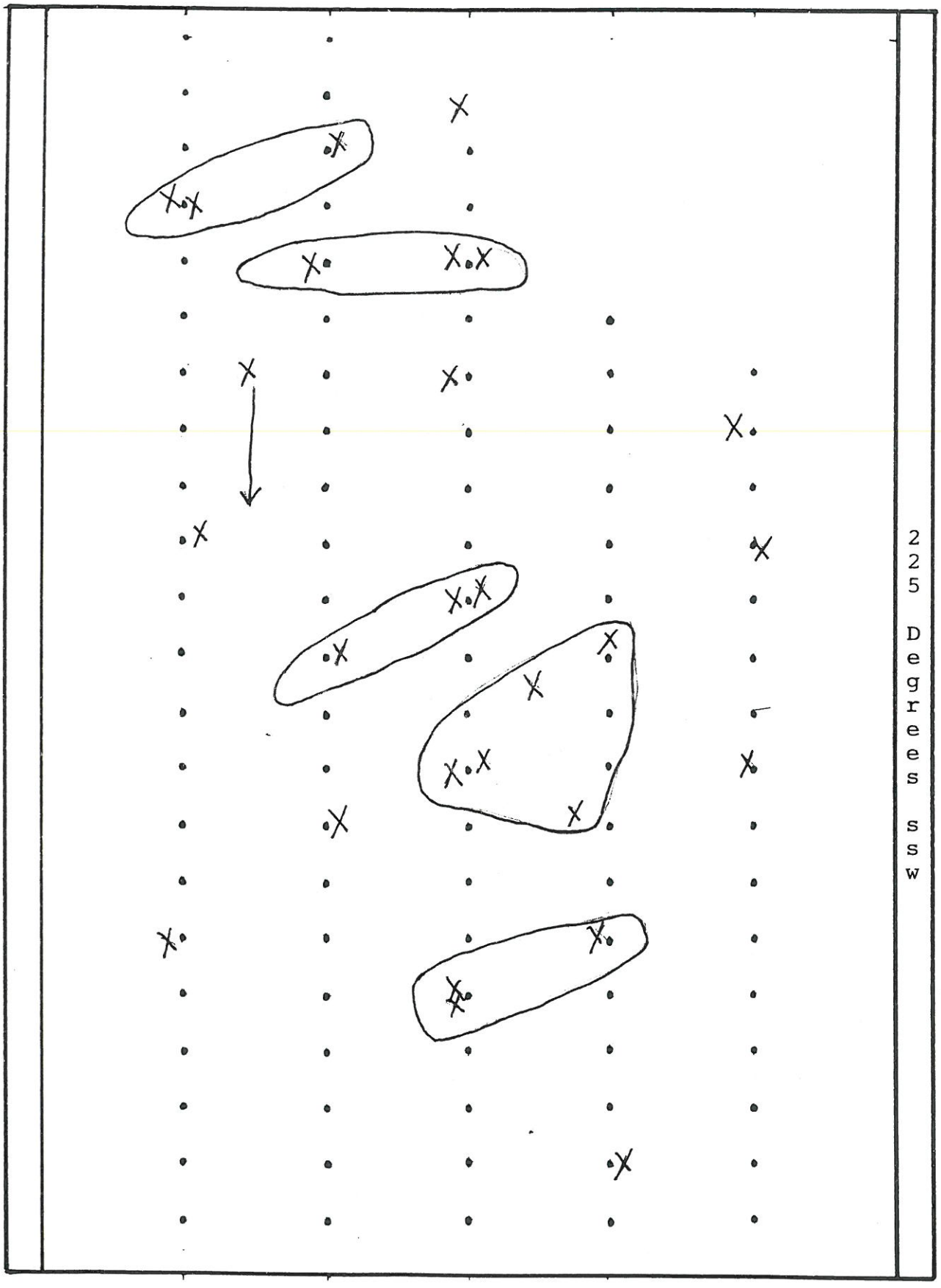


Blue Jay

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

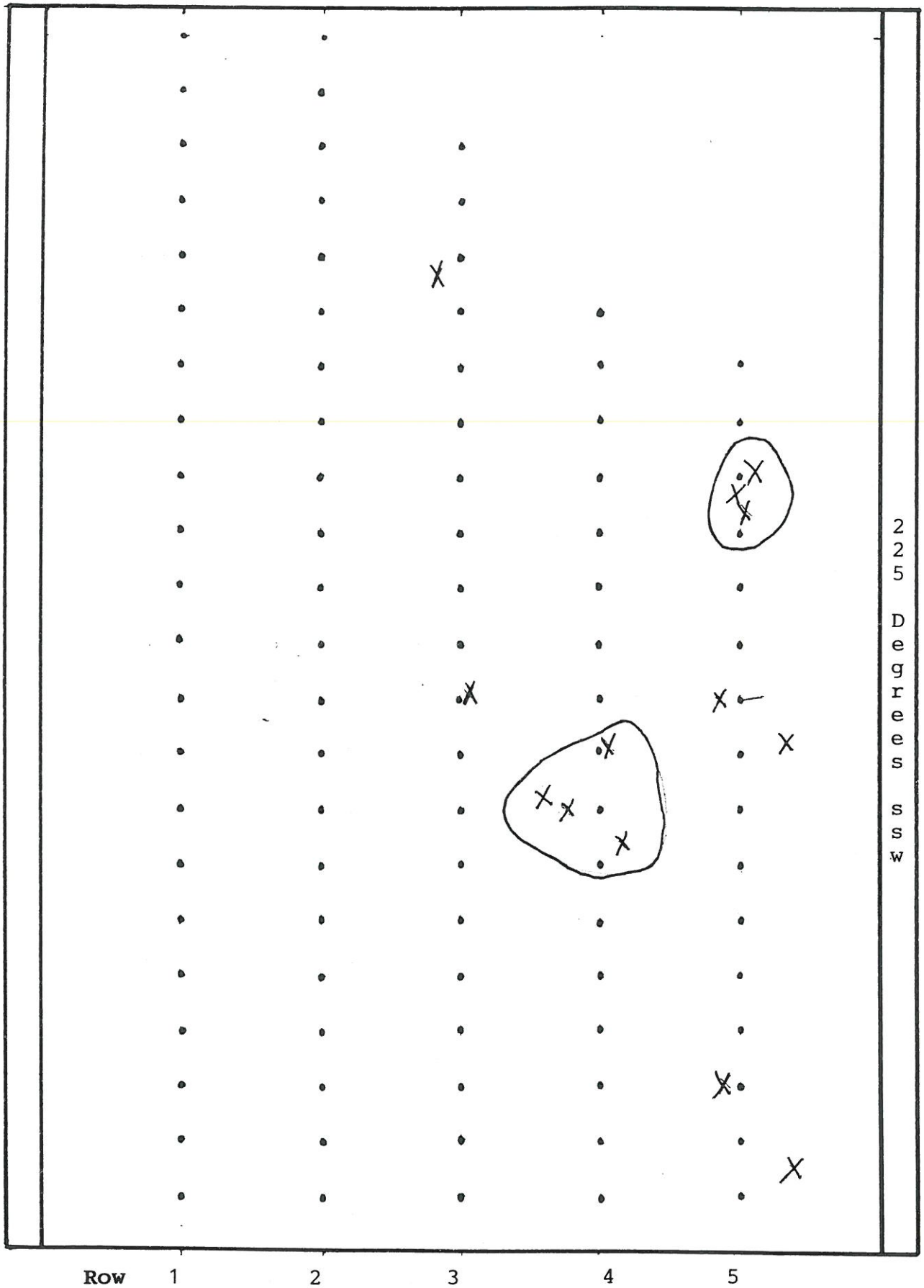


Carolina Chickadee

Scale

1 in. = 50 m
1 cm = 20 m

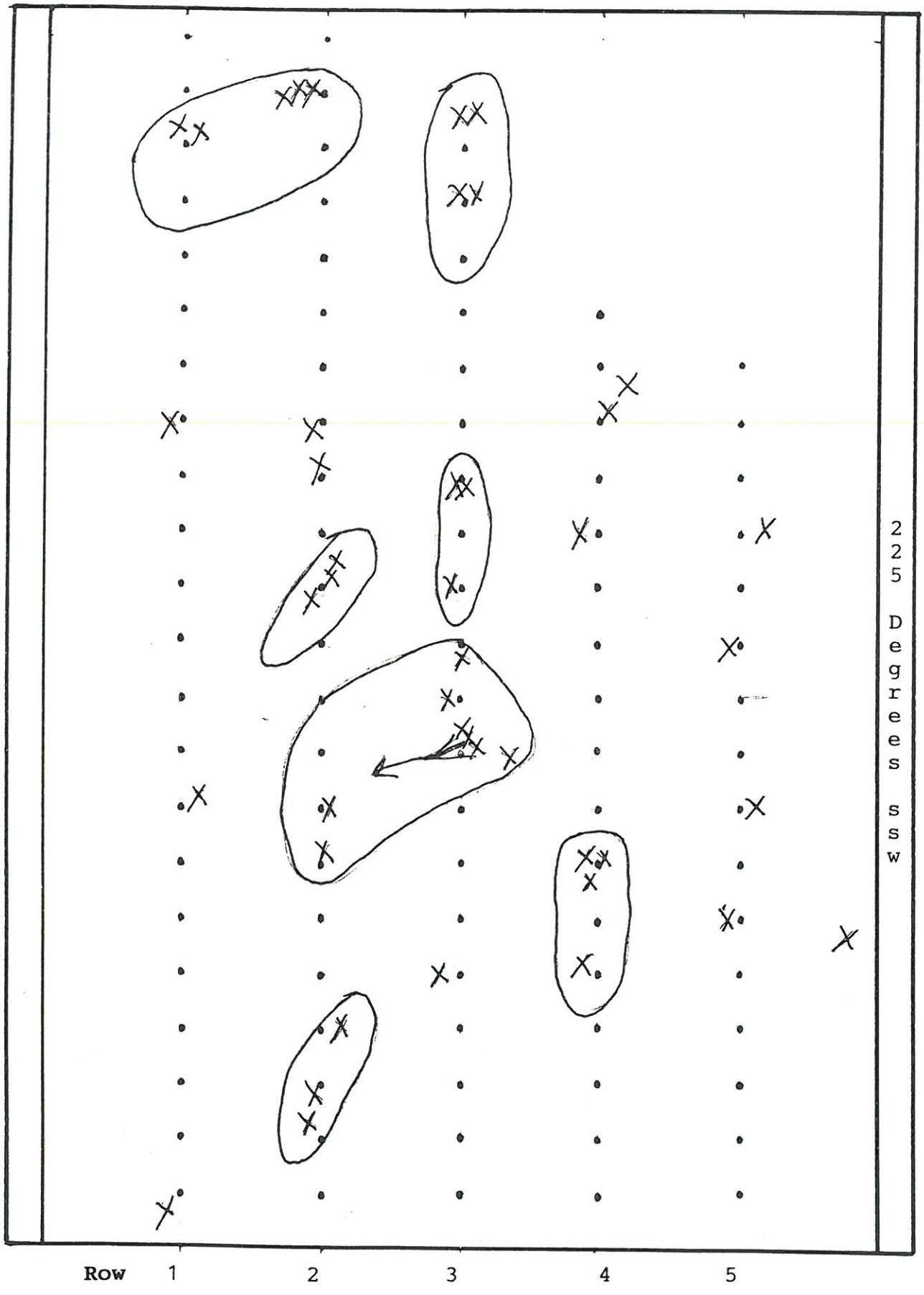
Kyanite
Plot 2



White-breasted Nuthatch

Scale

1 in. = 50 m
1 cm = 20 m

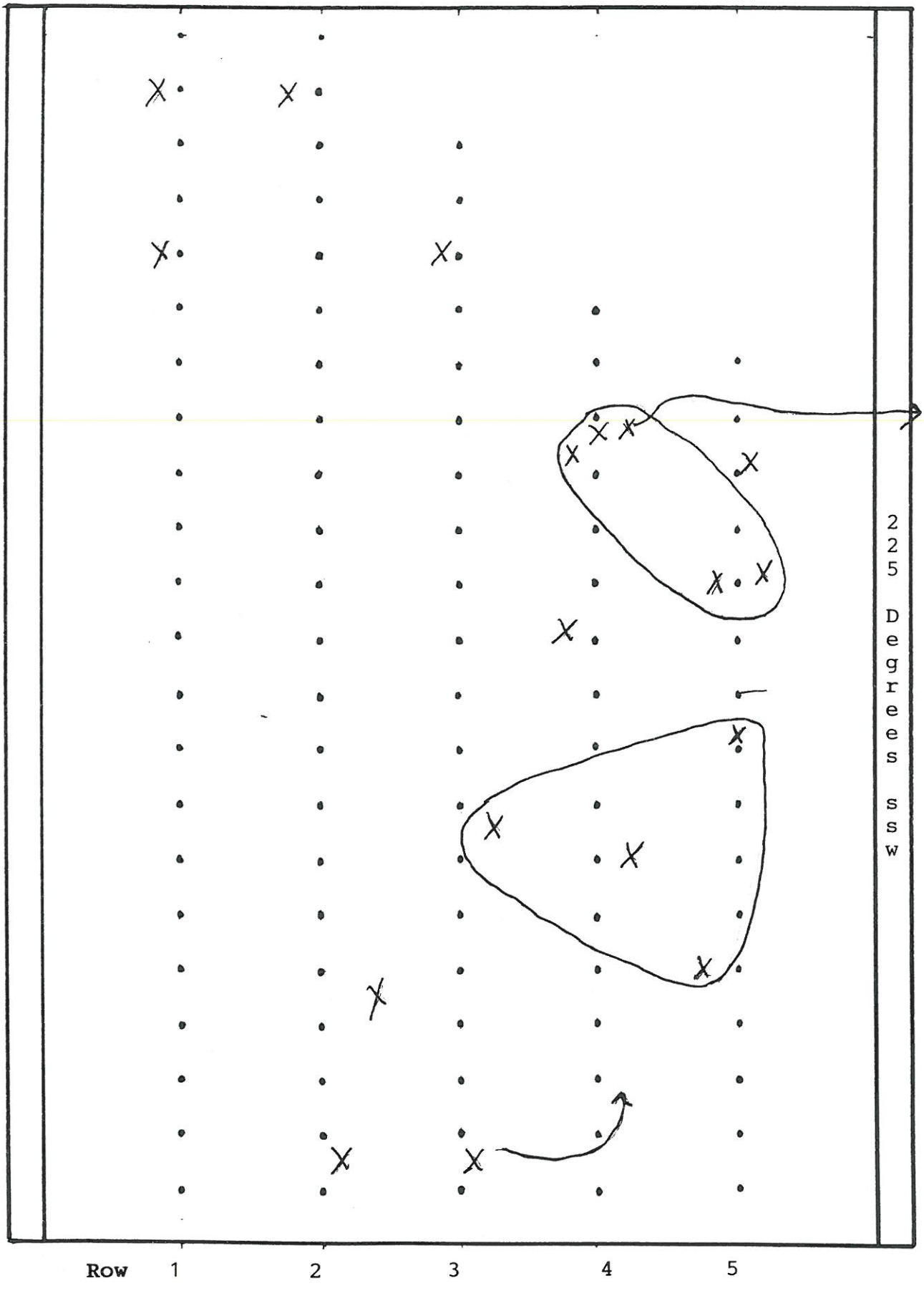


Carolina Wren

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

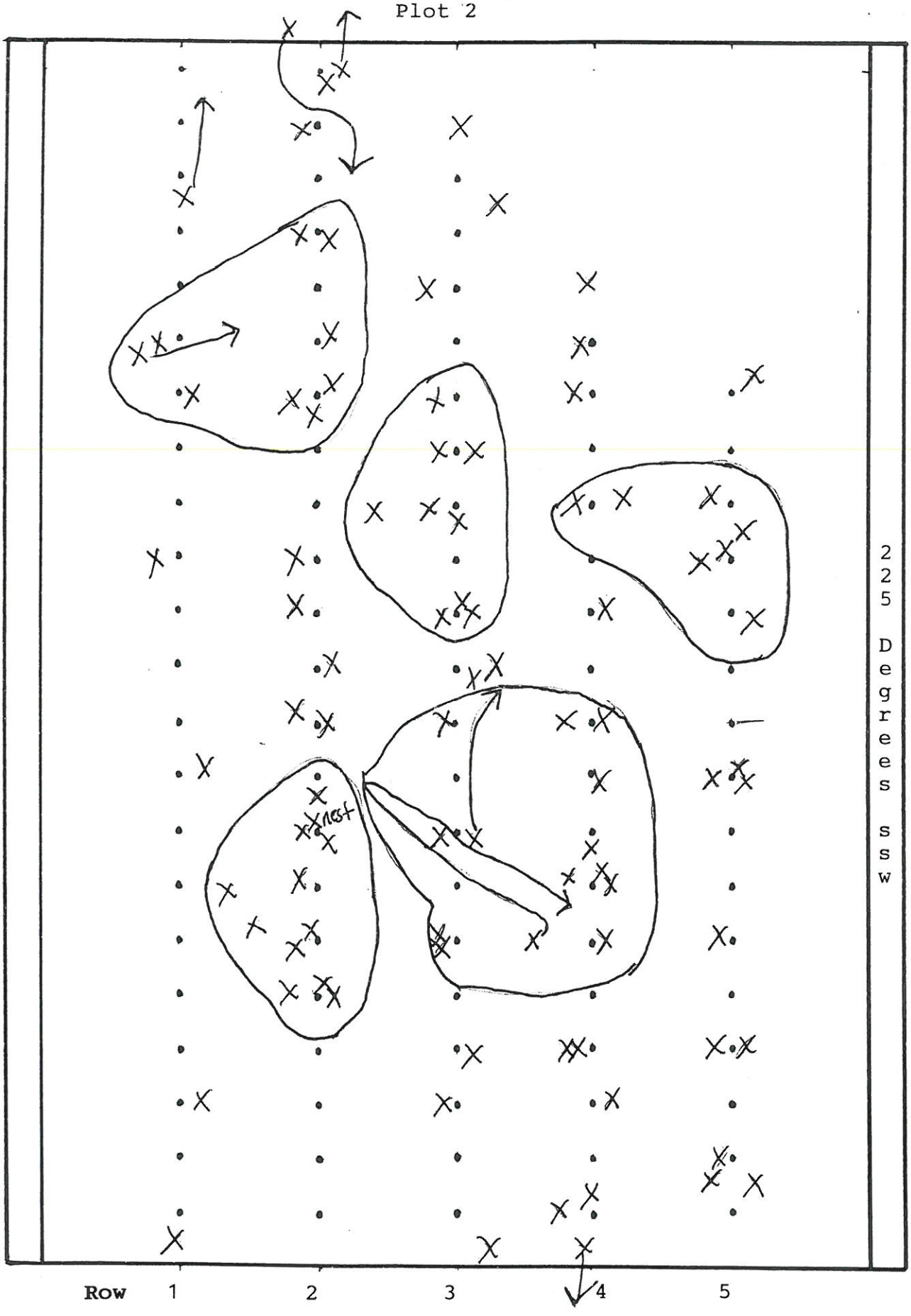


Blue-gray Gnatcatcher

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

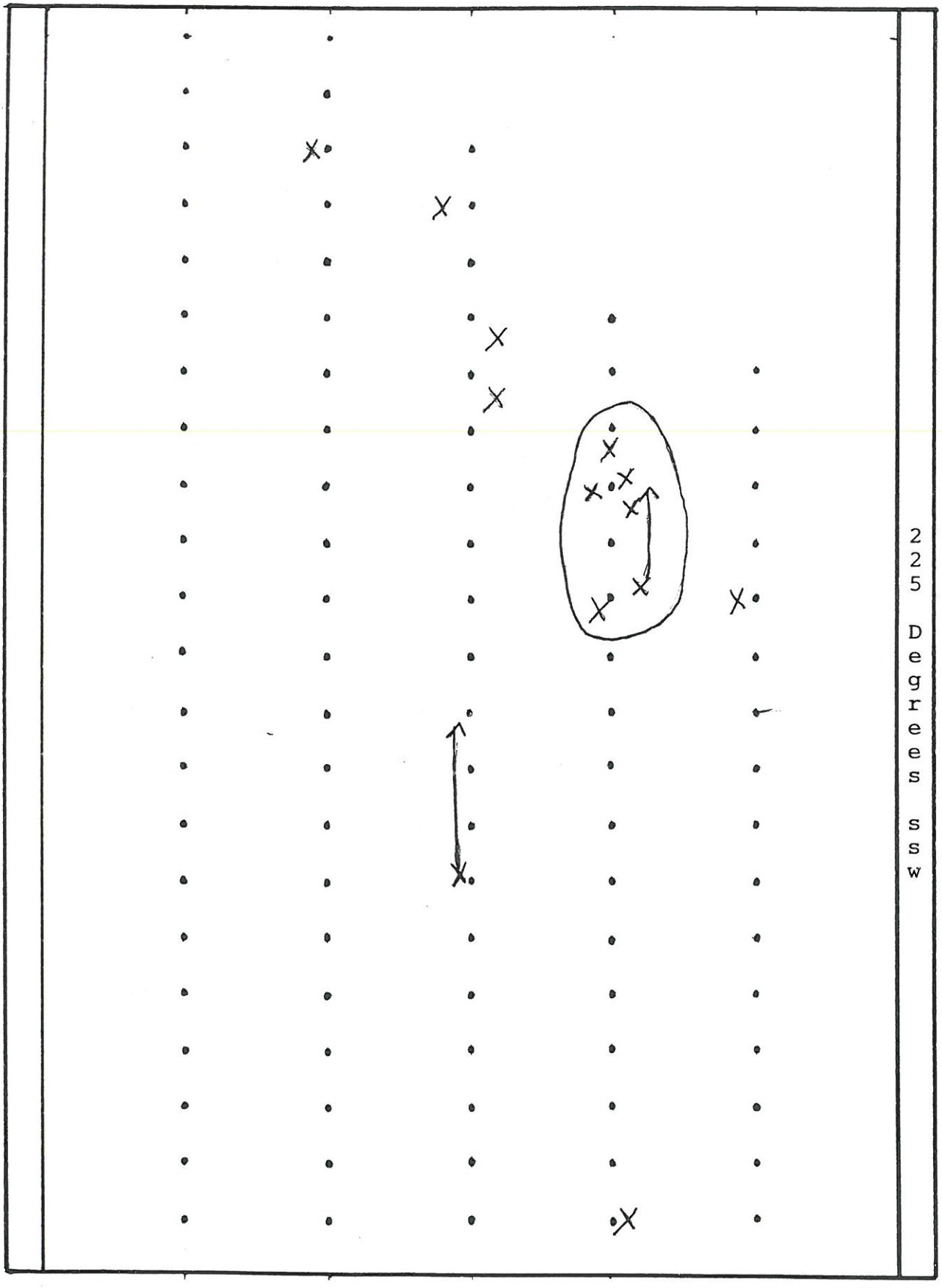


Red-Eyed Vireo

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

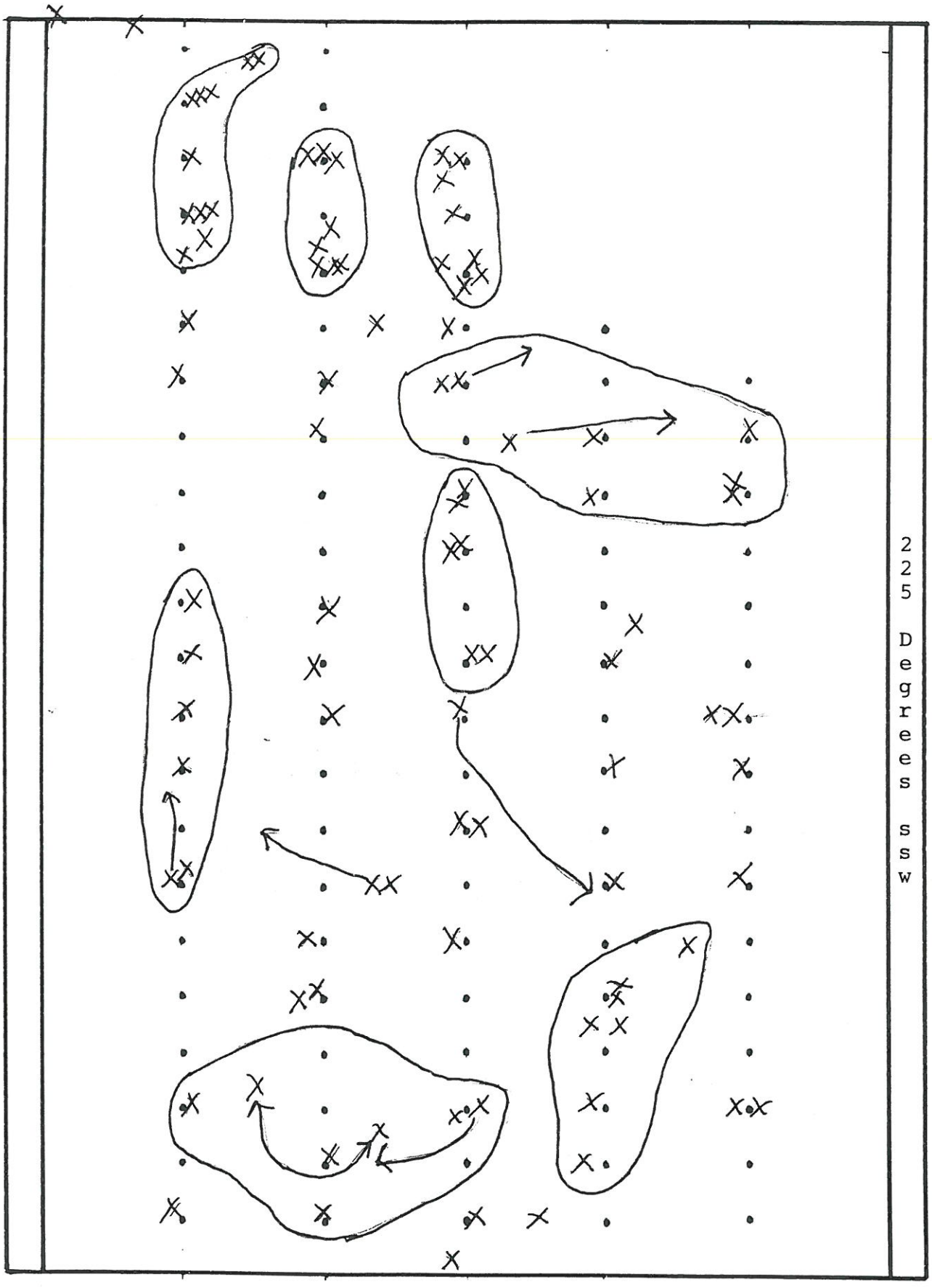


Common Yellowthroat

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

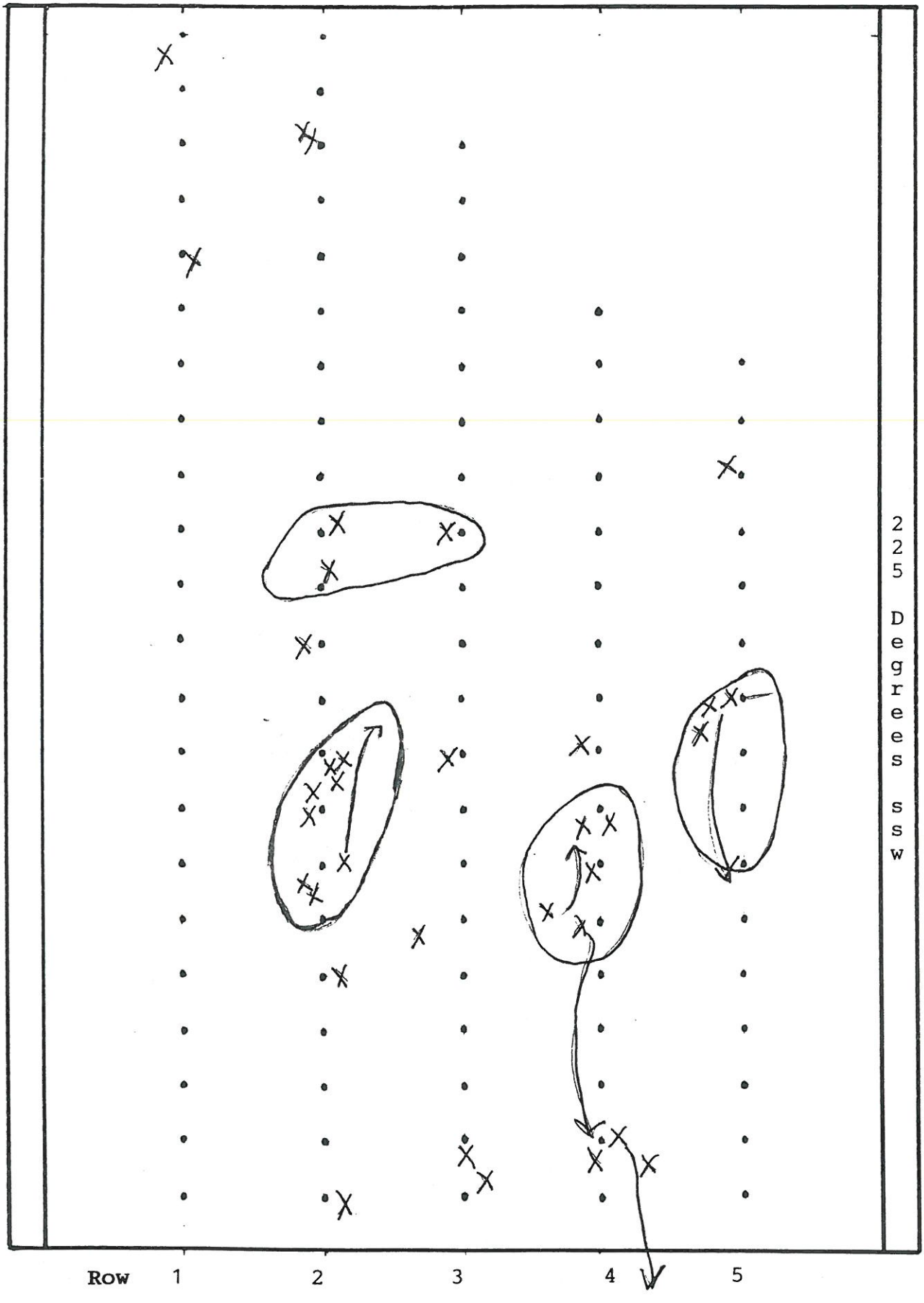


Indigo Bunting

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

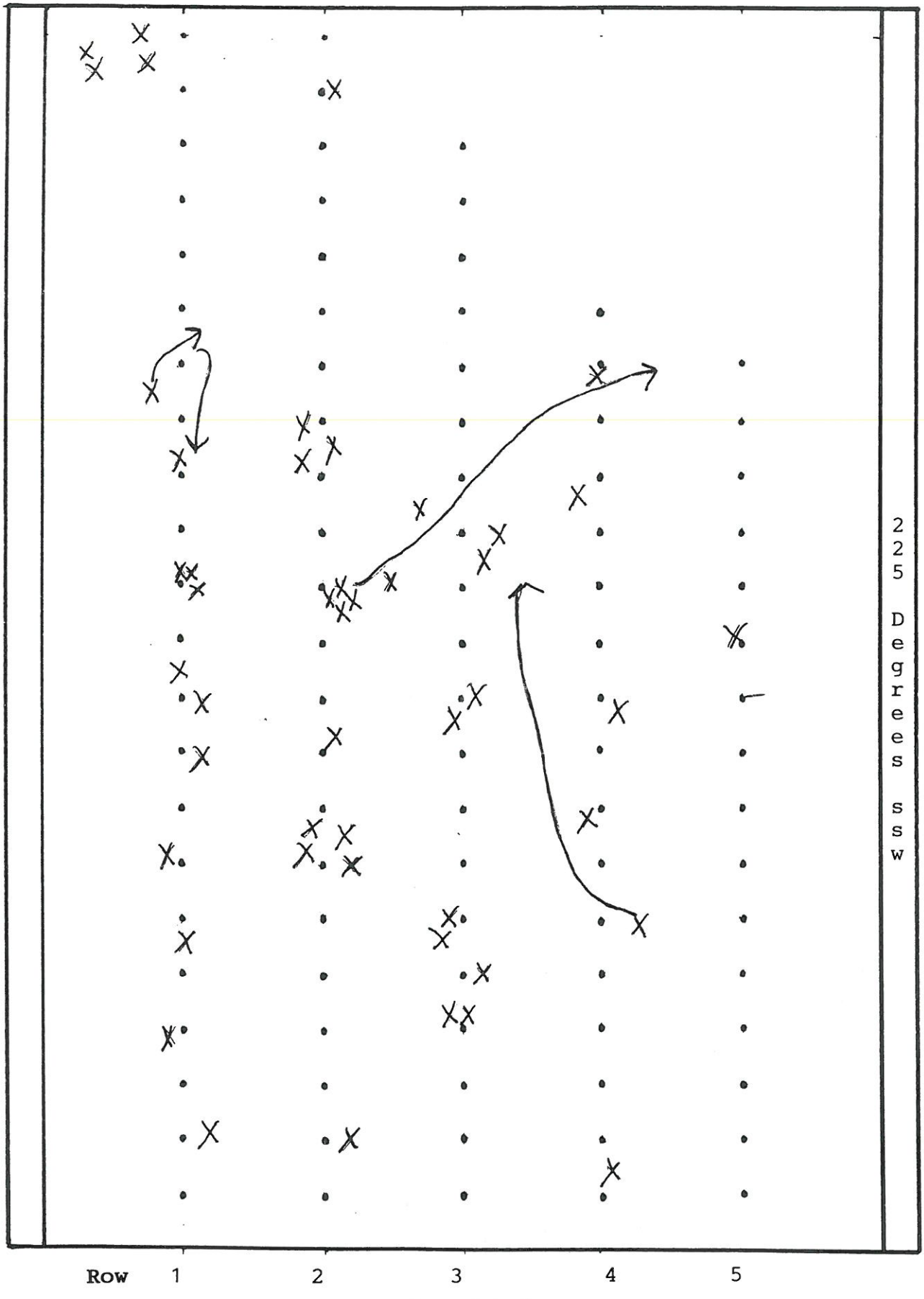


Rufous-sided Towhee

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

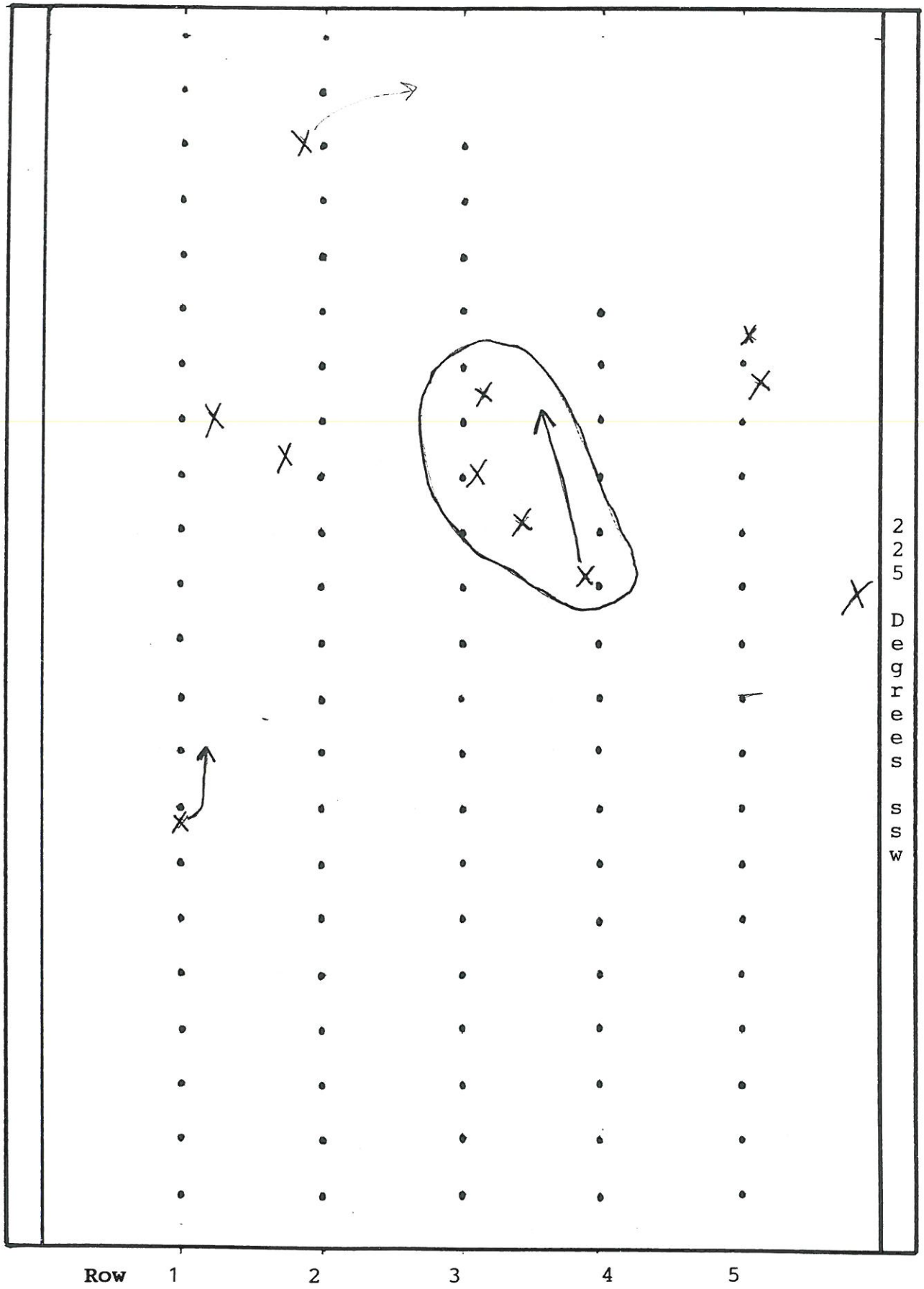


Brown-headed Cowbird

Scale

1 in. = 50 m
1 cm = 20 m

Kyanite
Plot 2

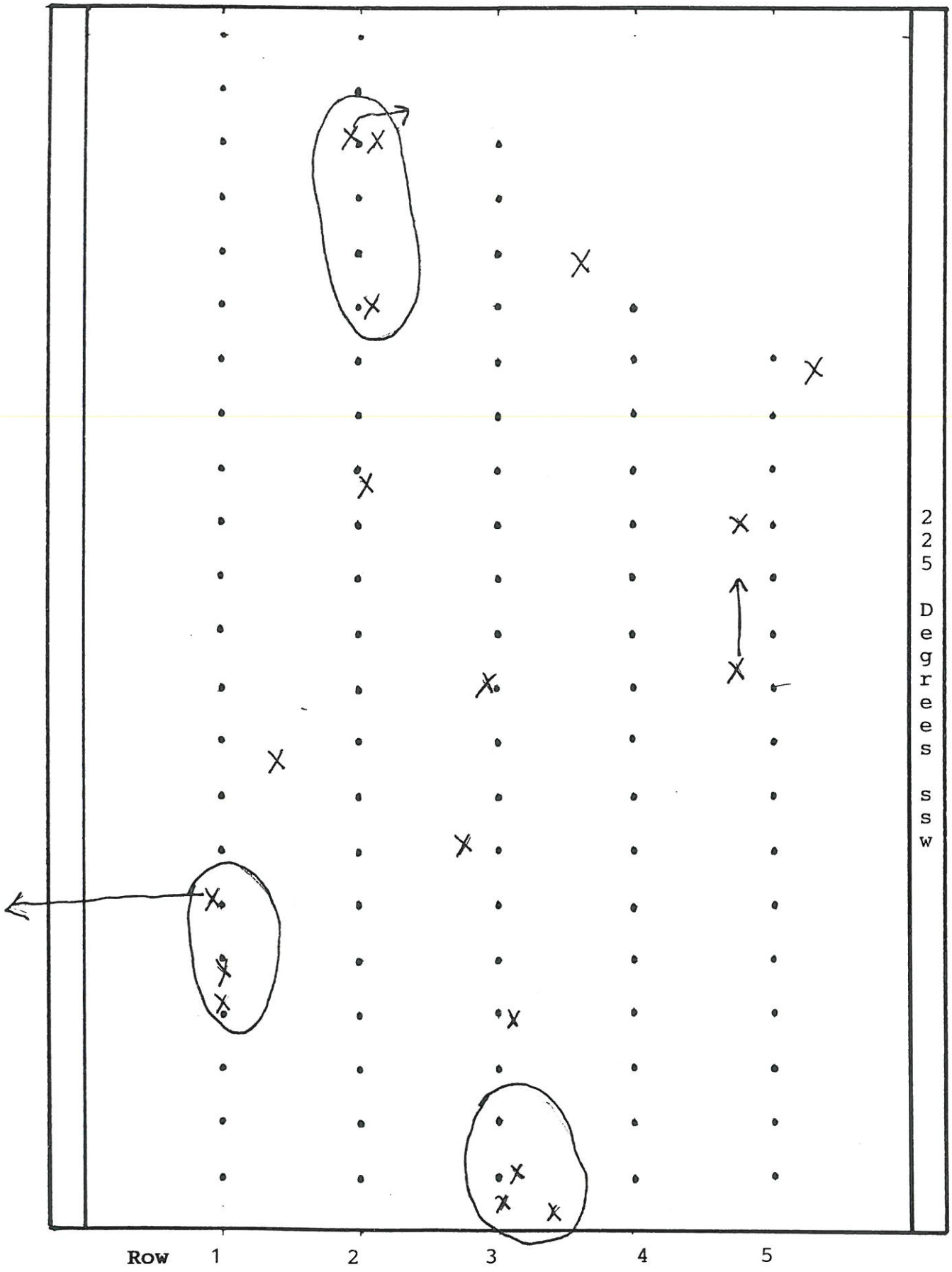


Scarlet Tanager

Scale

1 in. = 50 m
1 cm = 20 m

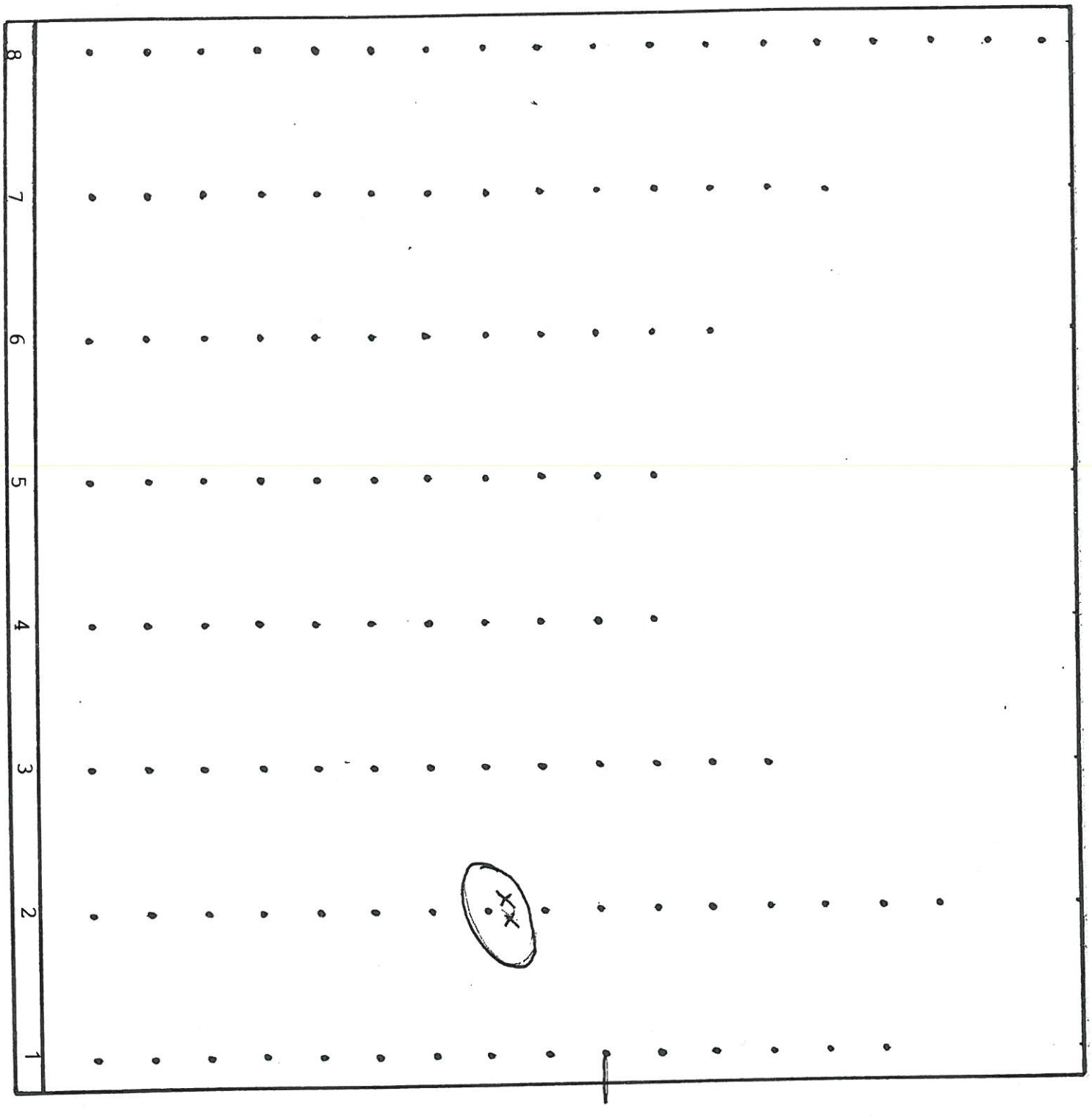
Kyanite
Plot 2



Summer Tanager

Scale

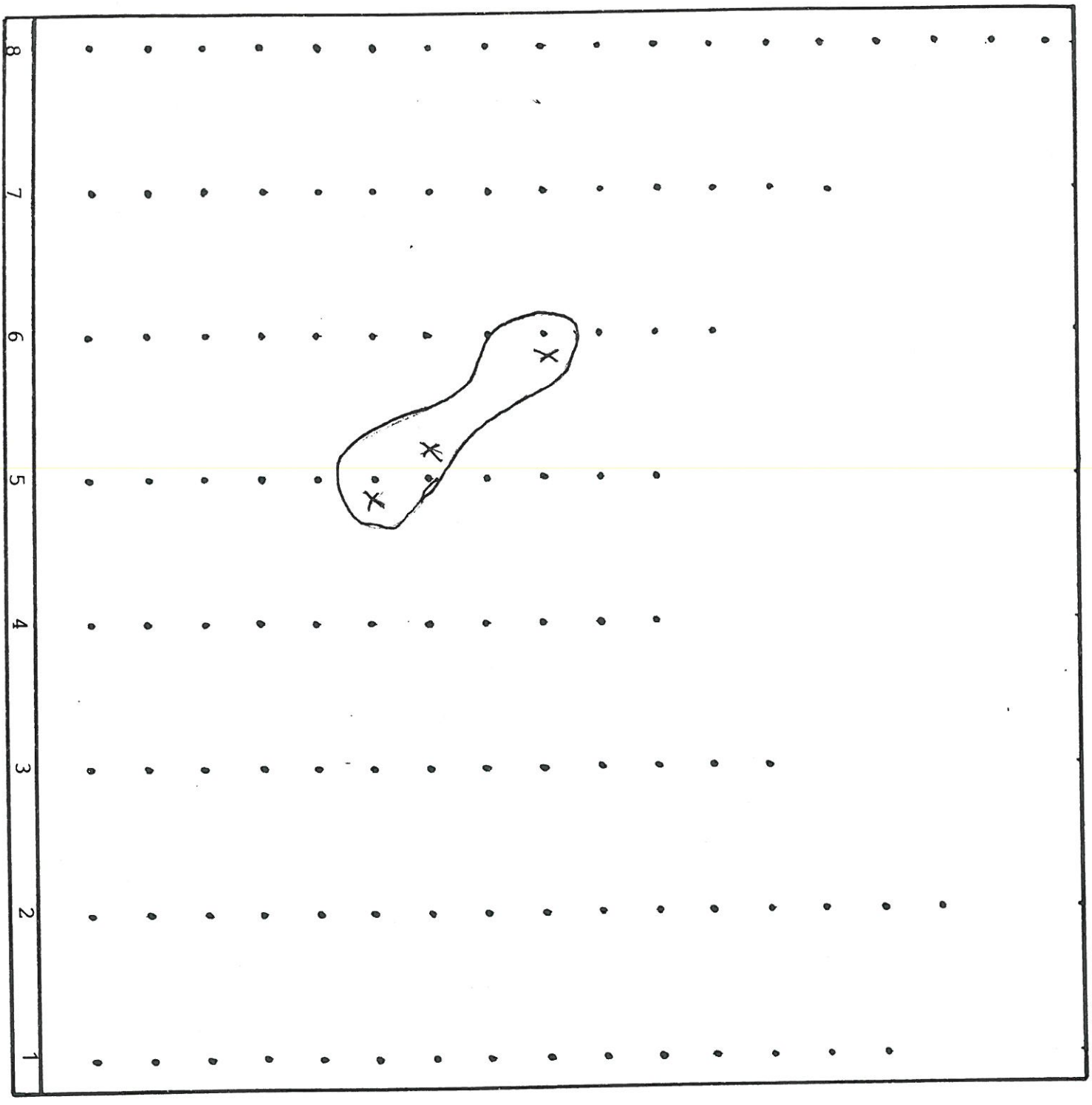
1 in. = 50 m
1 cm = 20 m



Scale

1 in. = 50 m
1 cm = 20 m

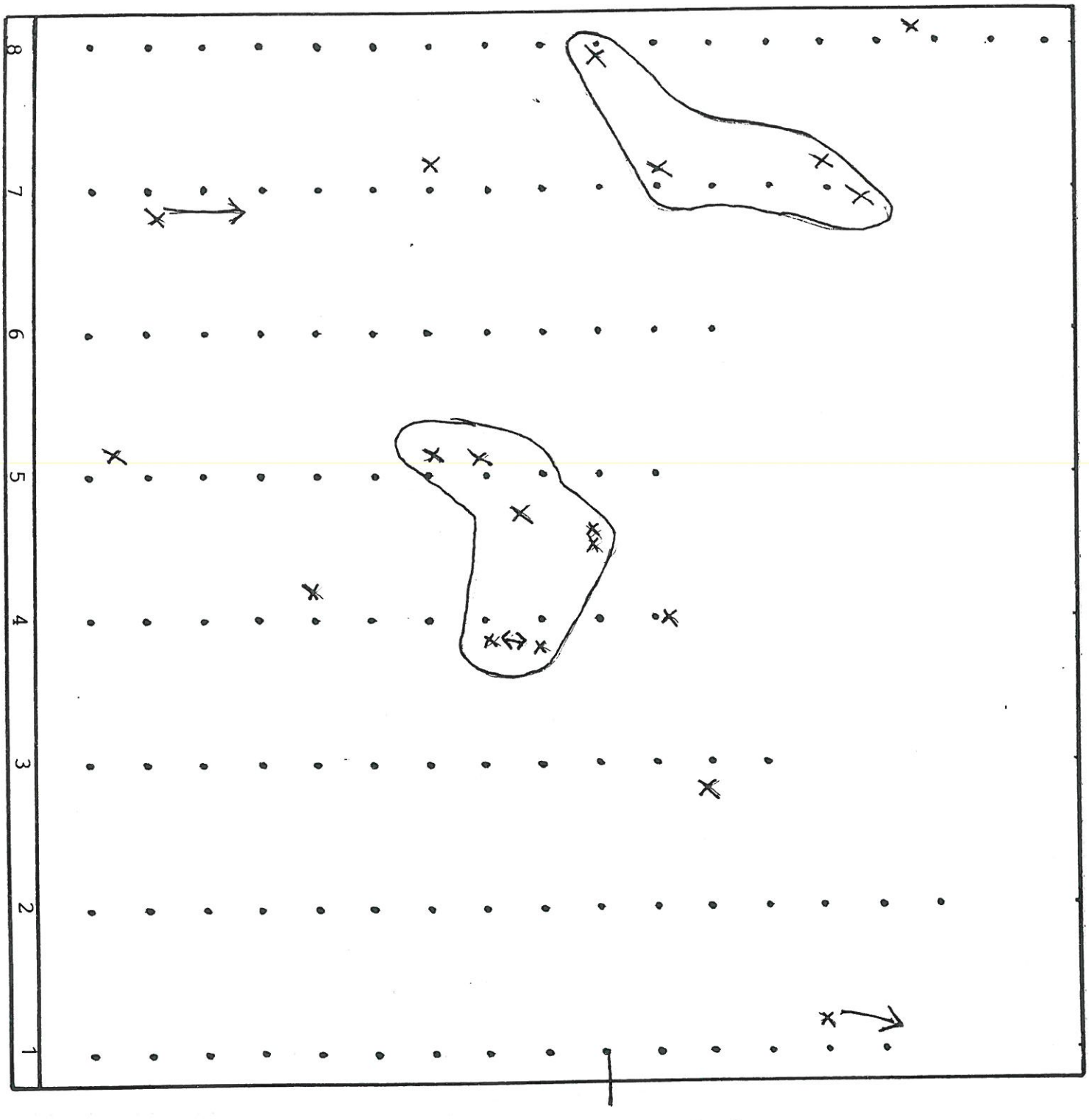
Whip-poor-will



Yellow-billed Cuckoo

Scale

1 in. = 50 m
1 cm = 20 m

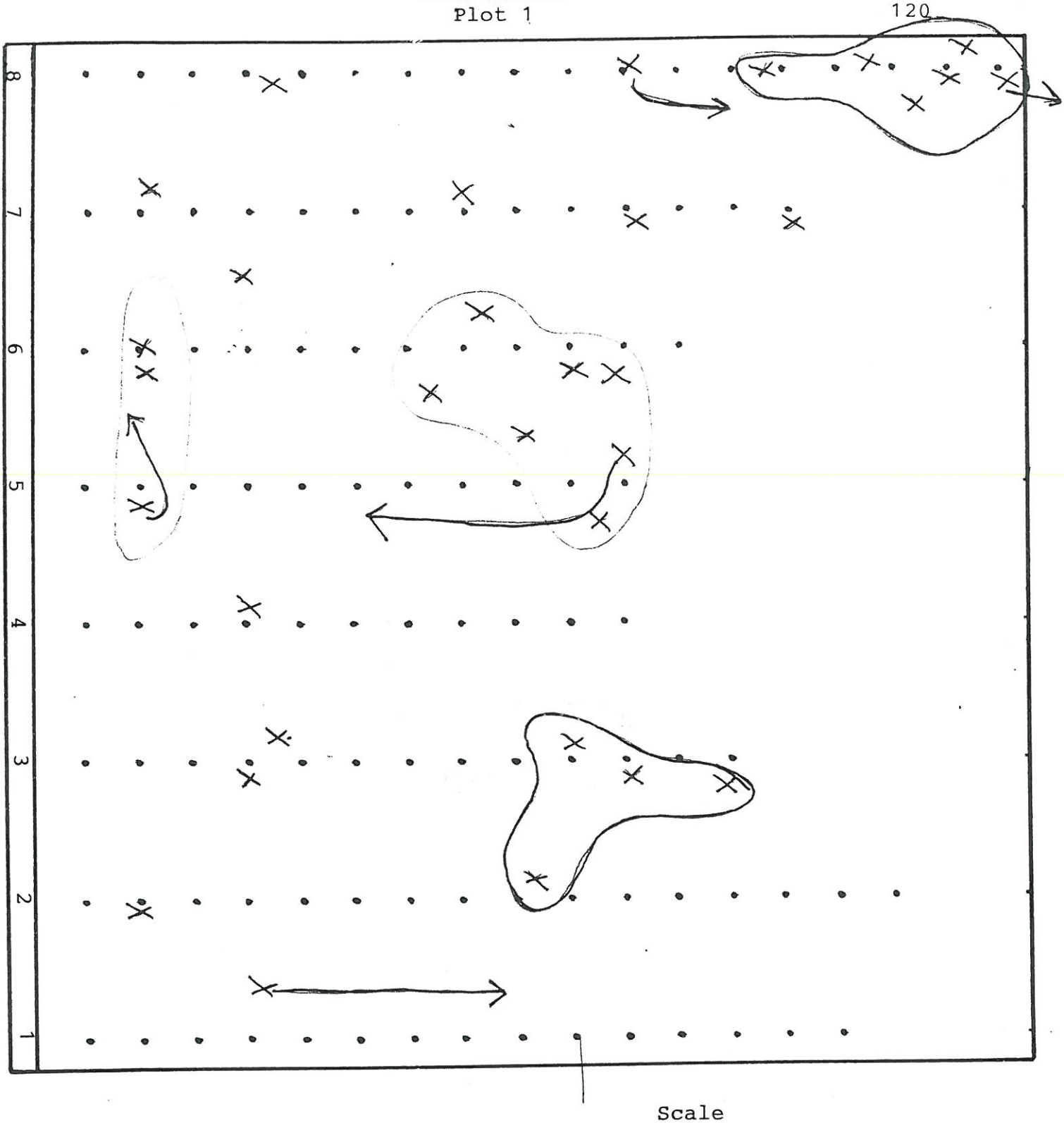


Scale

1 in. = 50 m
1 cm = 20 m

Great-Crested Flycatcher

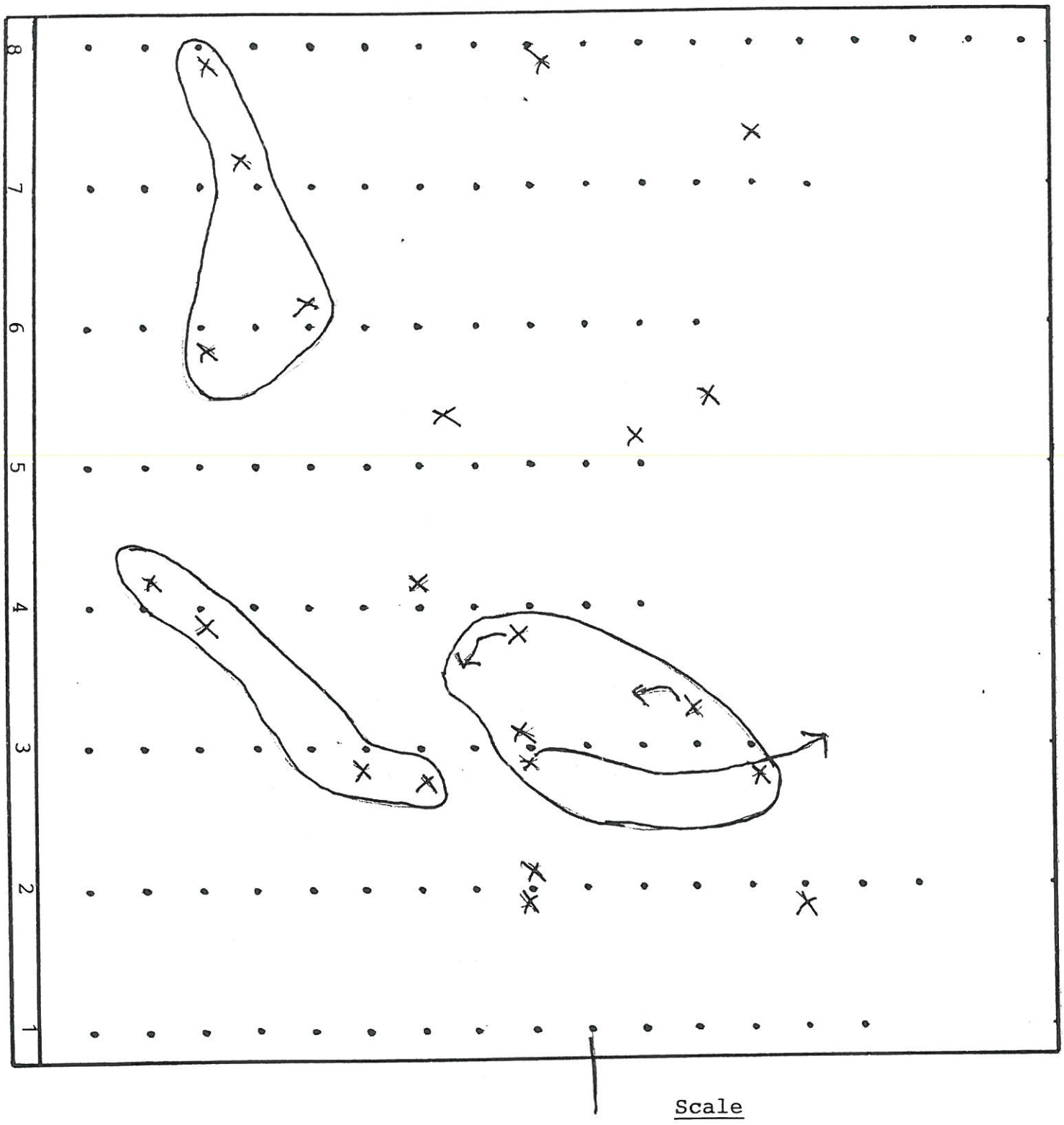
Plot 1



Eastern Wood-Pewee

Scale

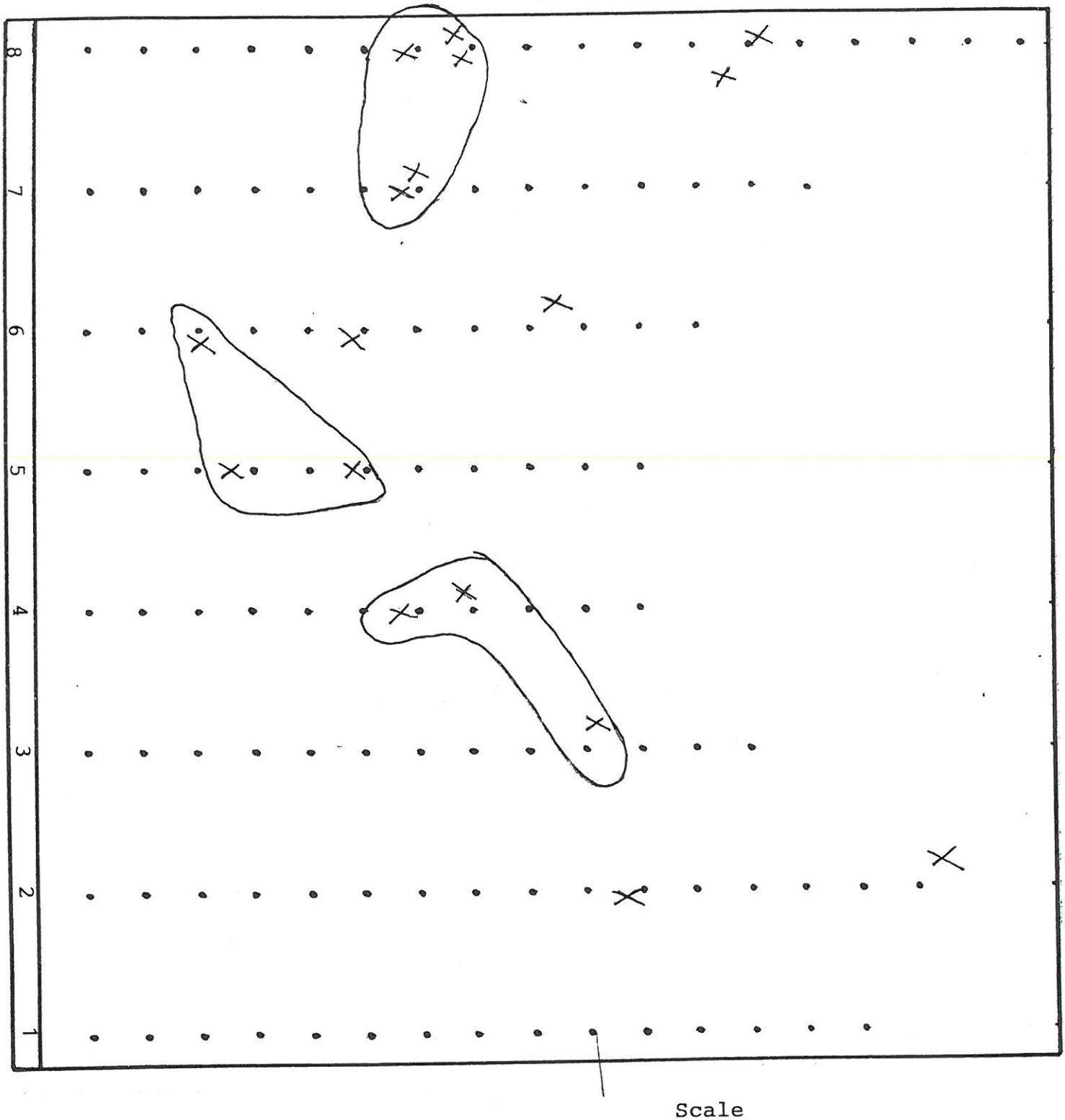
1 in. = 50 m
1 cm = 20 m



Tufted Titmouse

Scale

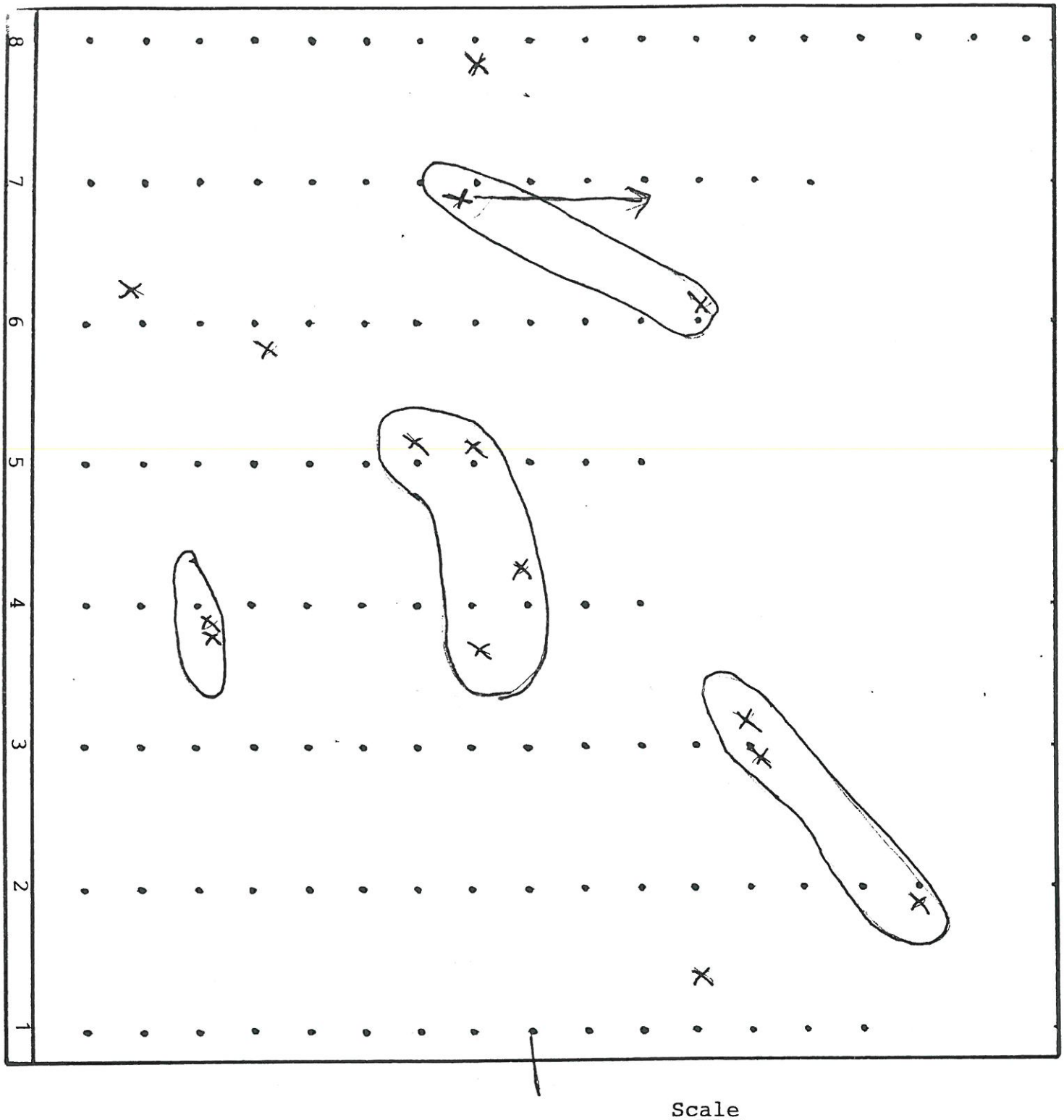
1 in. = 50 m
1 cm = 20 m



Carolina Chickadee

Scale

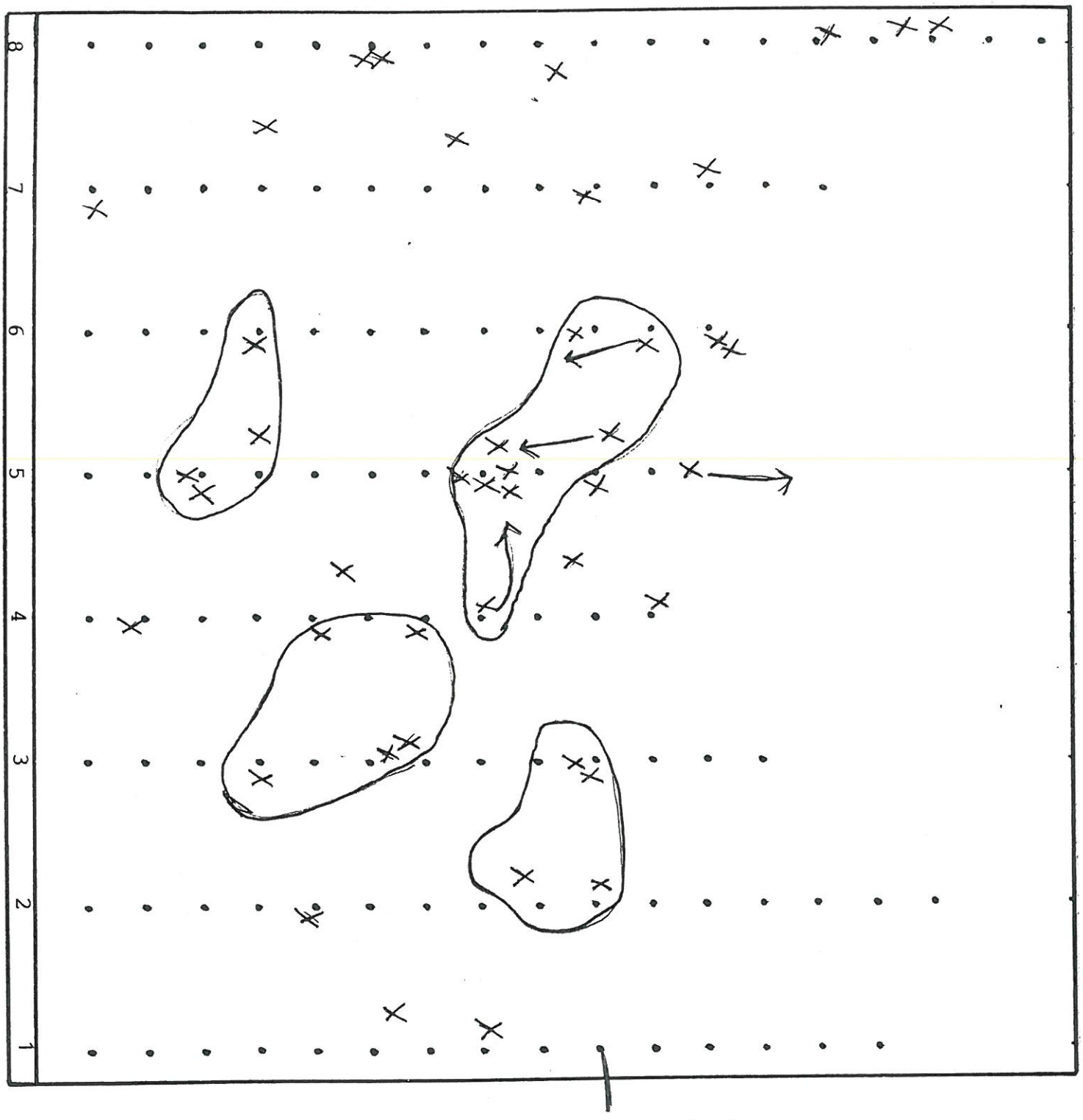
1 in. = 50 m
1 cm = 20 m



White-breasted Nuthatch

Scale

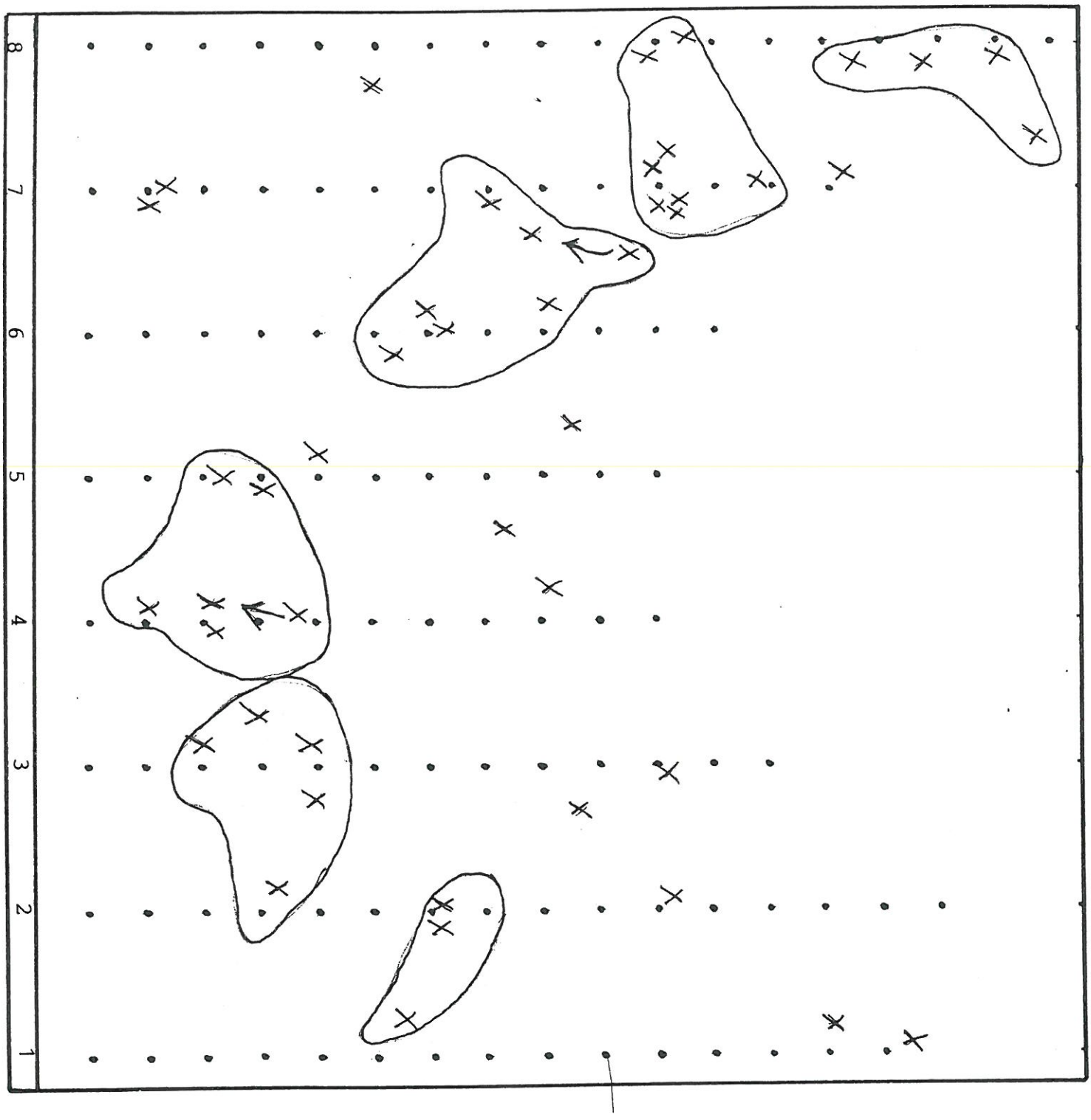
1 in. = 50 m
1 cm = 20 m



Carolina Wren

Scale

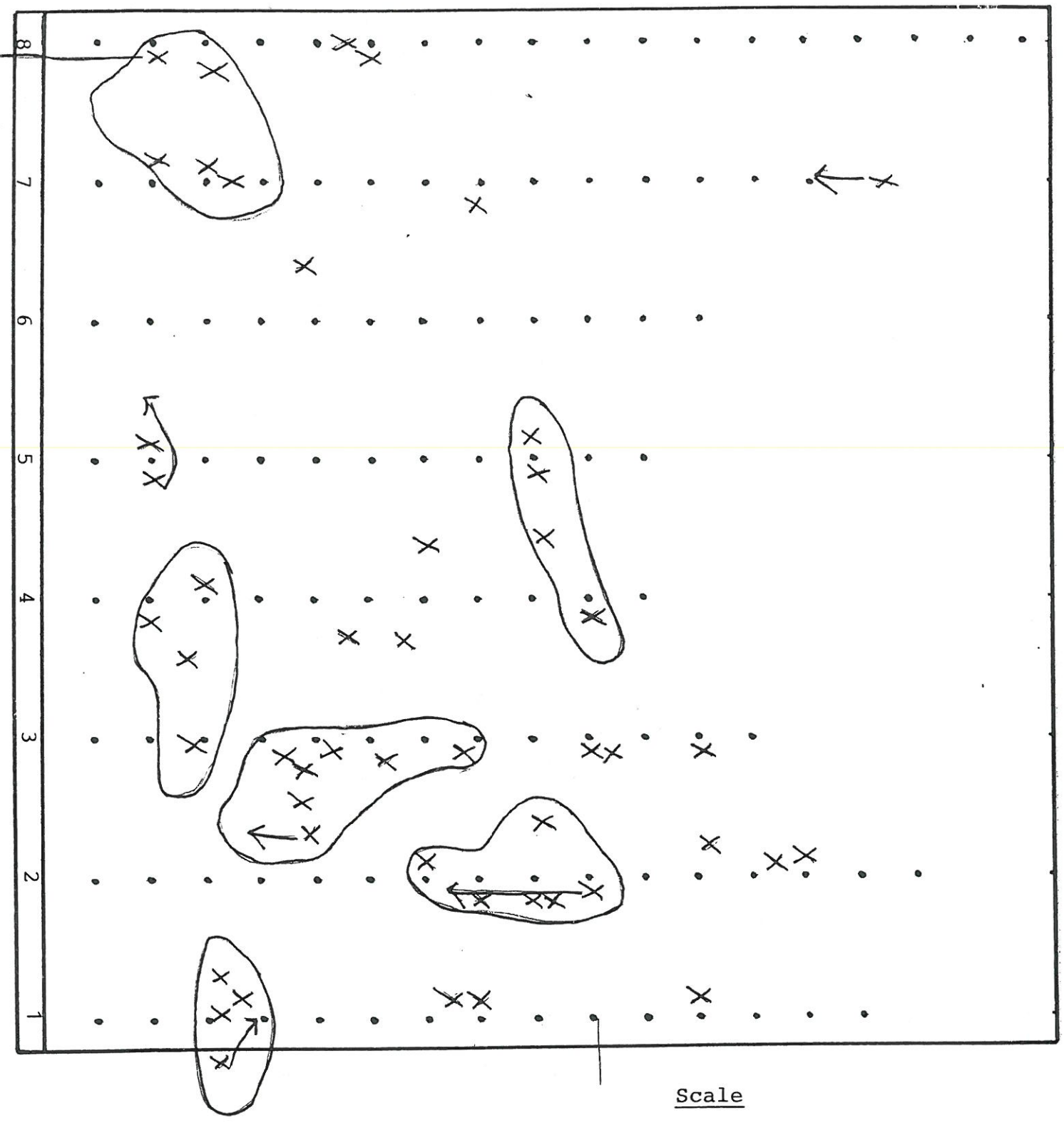
1 in. = 50 m
1 cm = 20 m



Blue-gray Gnatcatcher

Scale

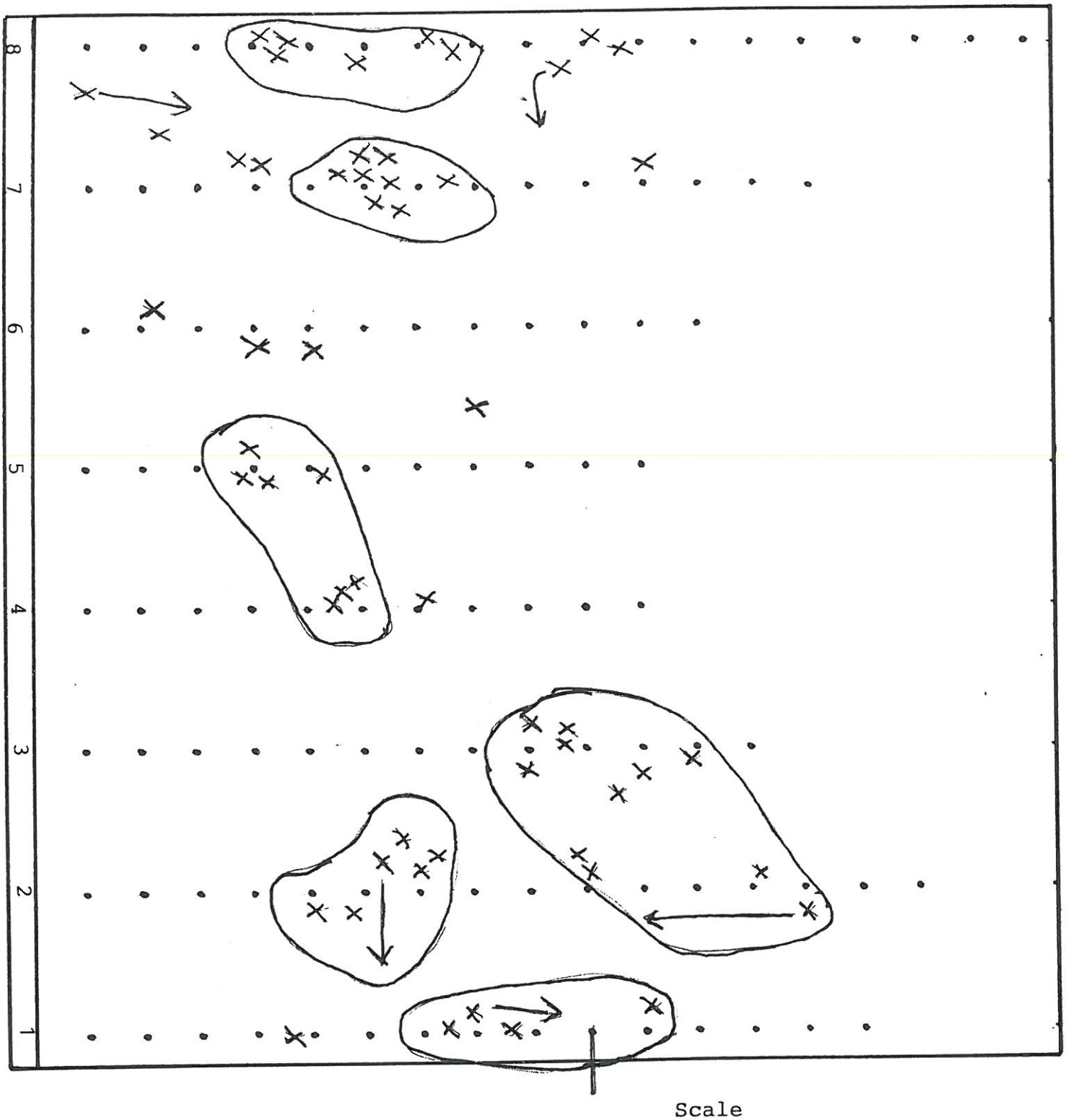
1 in. = 50 m
1 cm = 20 m



Scale

1 in. = 50 m
1 cm = 20 m

Red-Eyed Vireo



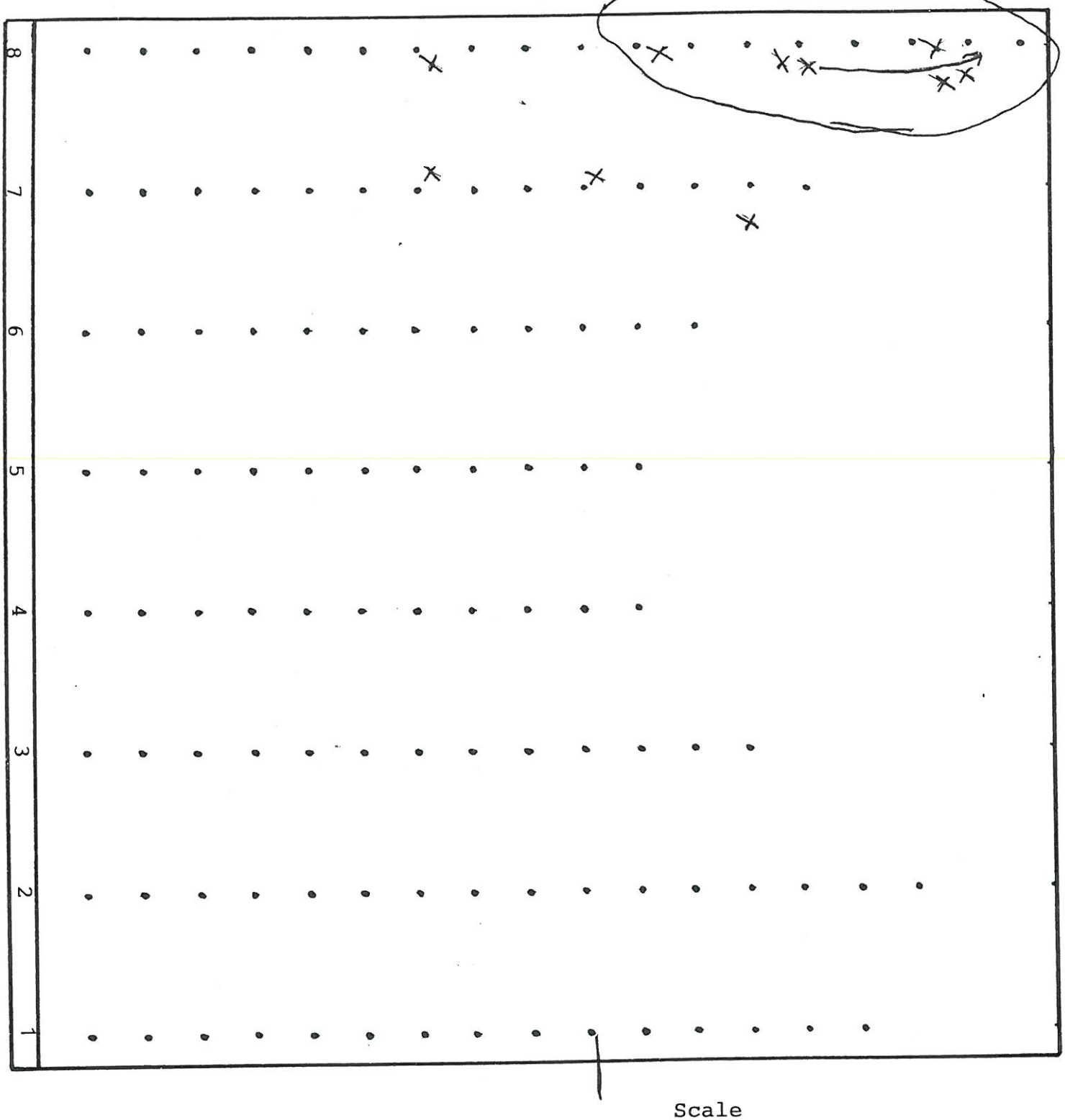
Prairie Warbler

Scale

1 in. = 50 m
1 cm = 20 m

Plot 1

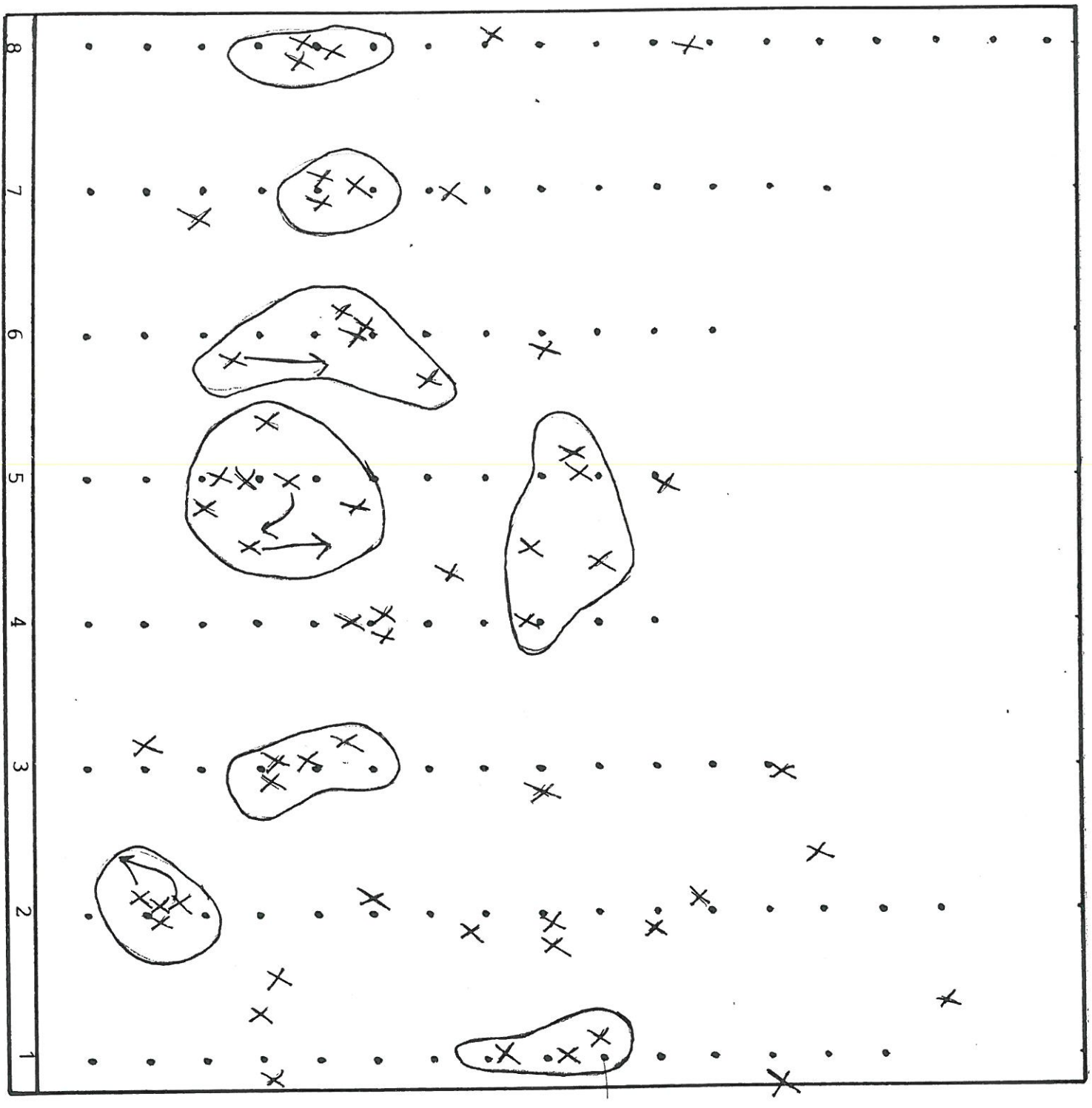
T28



Hooded Warbler

Scale

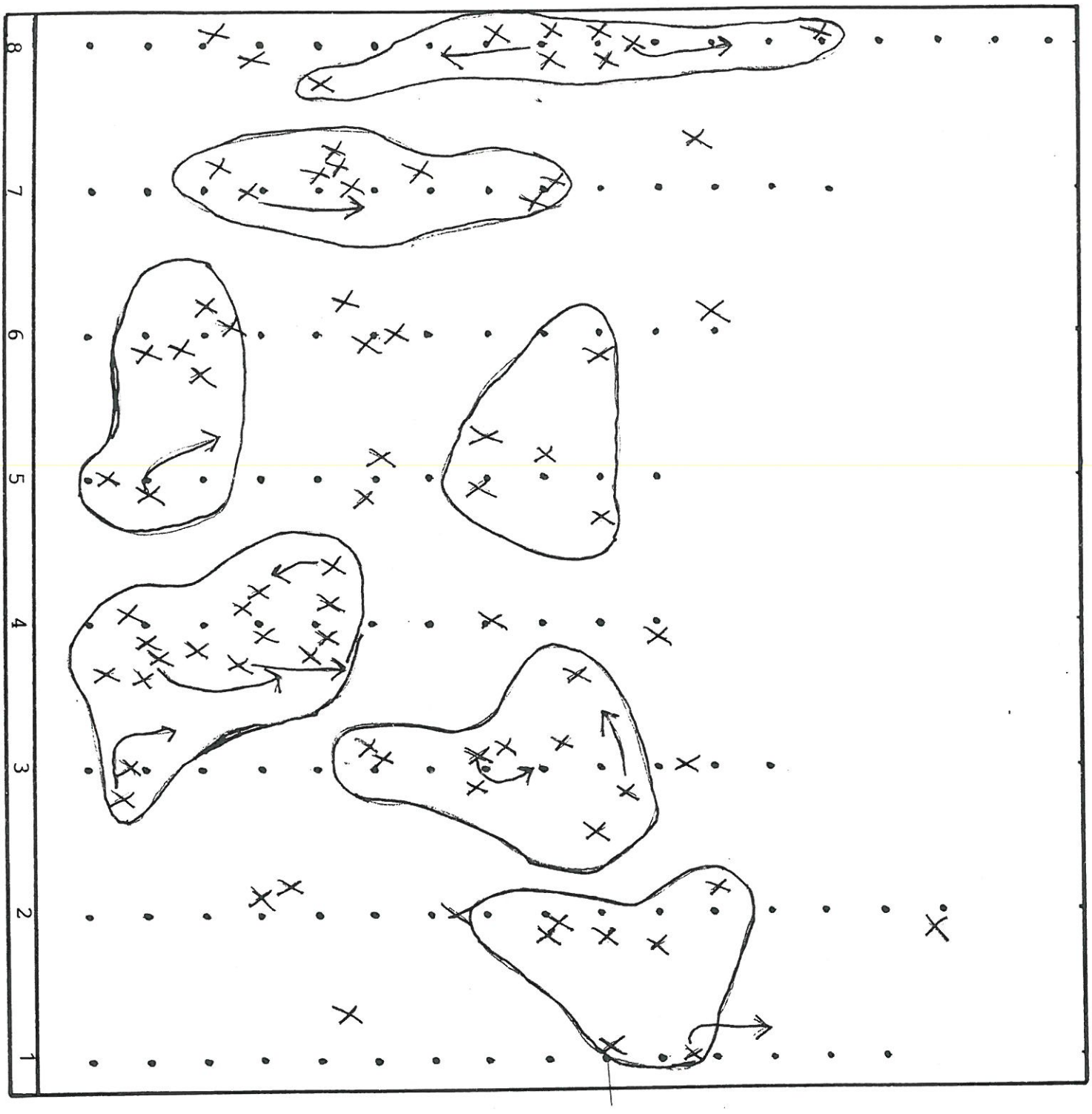
1 in. = 50 m
1 cm = 20 m



Indigo Bunting

Scale

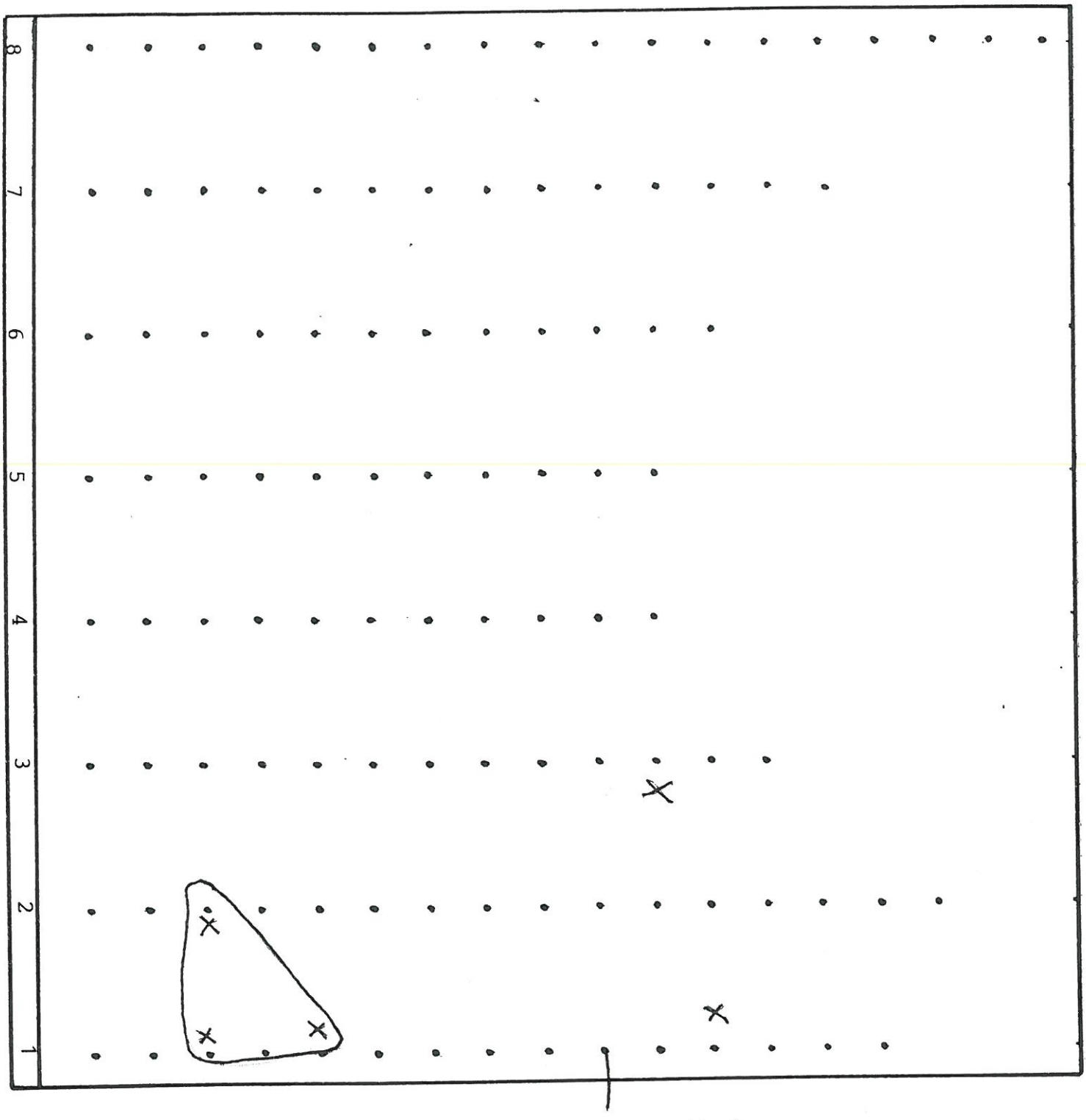
1 in. = 50 m
1 cm = 20 m



Rufous-sided Towhee

Scale

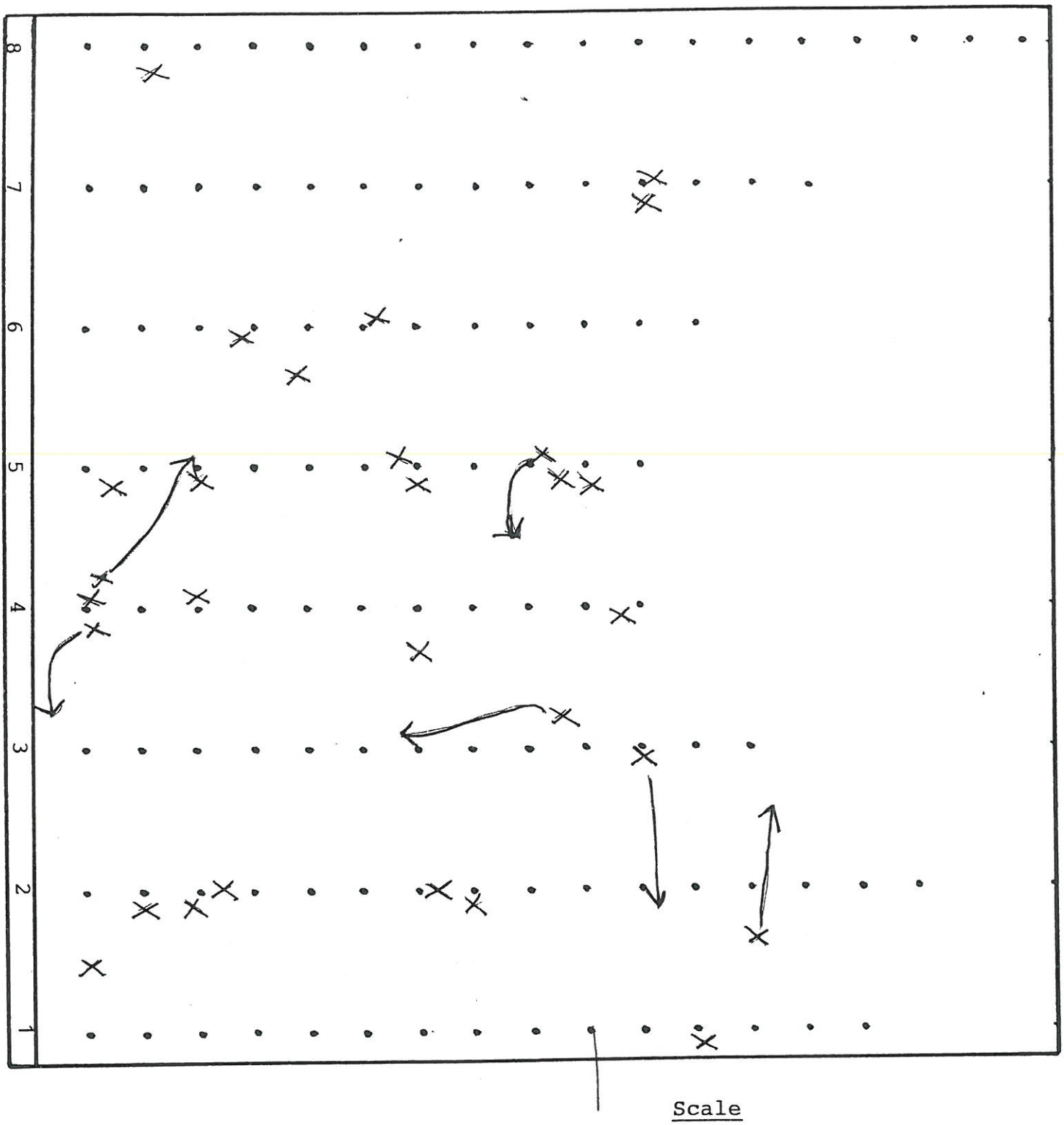
1 in. = 50 m
1 cm = 20 m



Field Sparrow

Scale

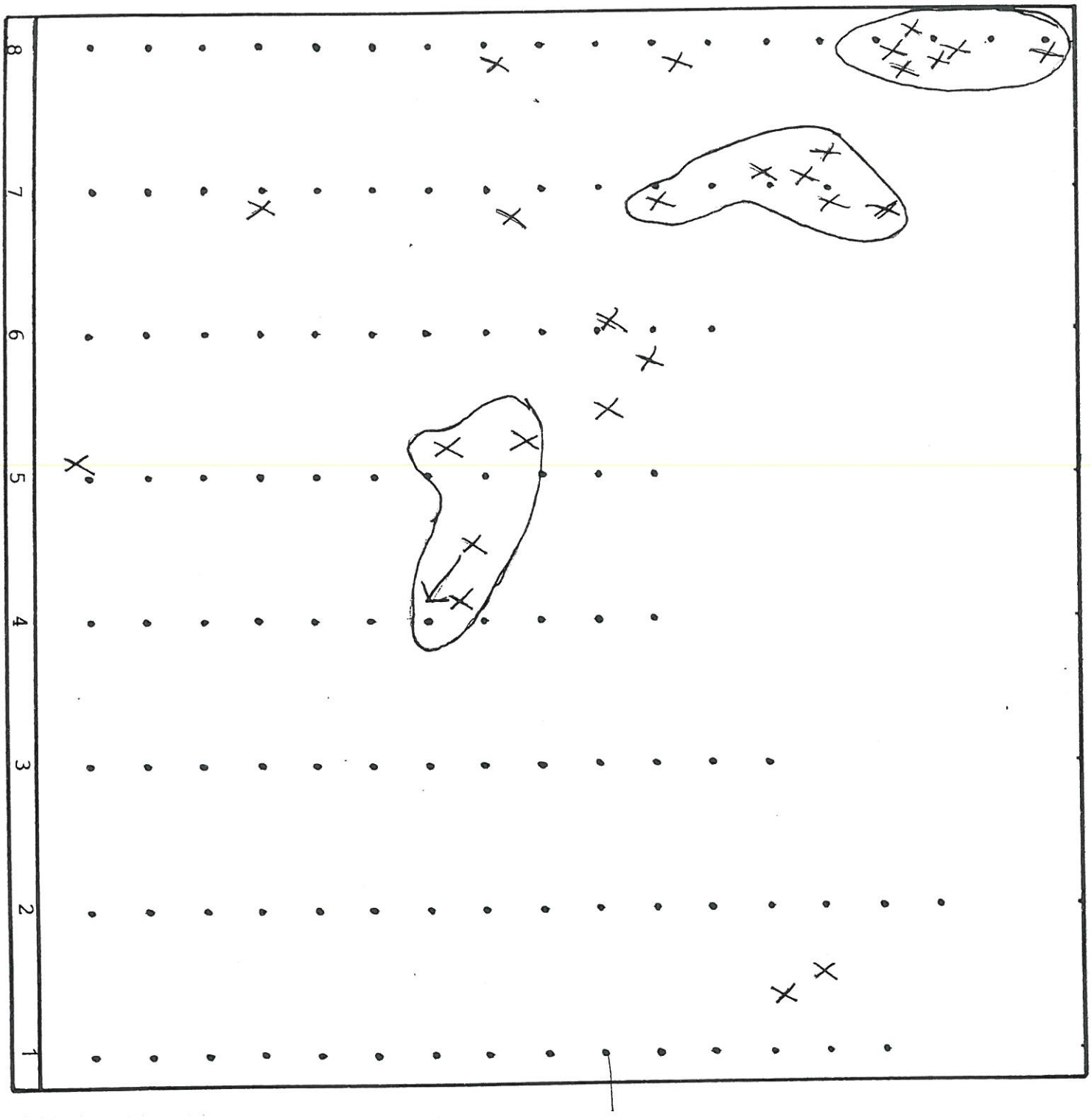
1 in. = 50 m
1 cm = 20 m



Scale

1 in. = 50 m
1 cm = 20 m

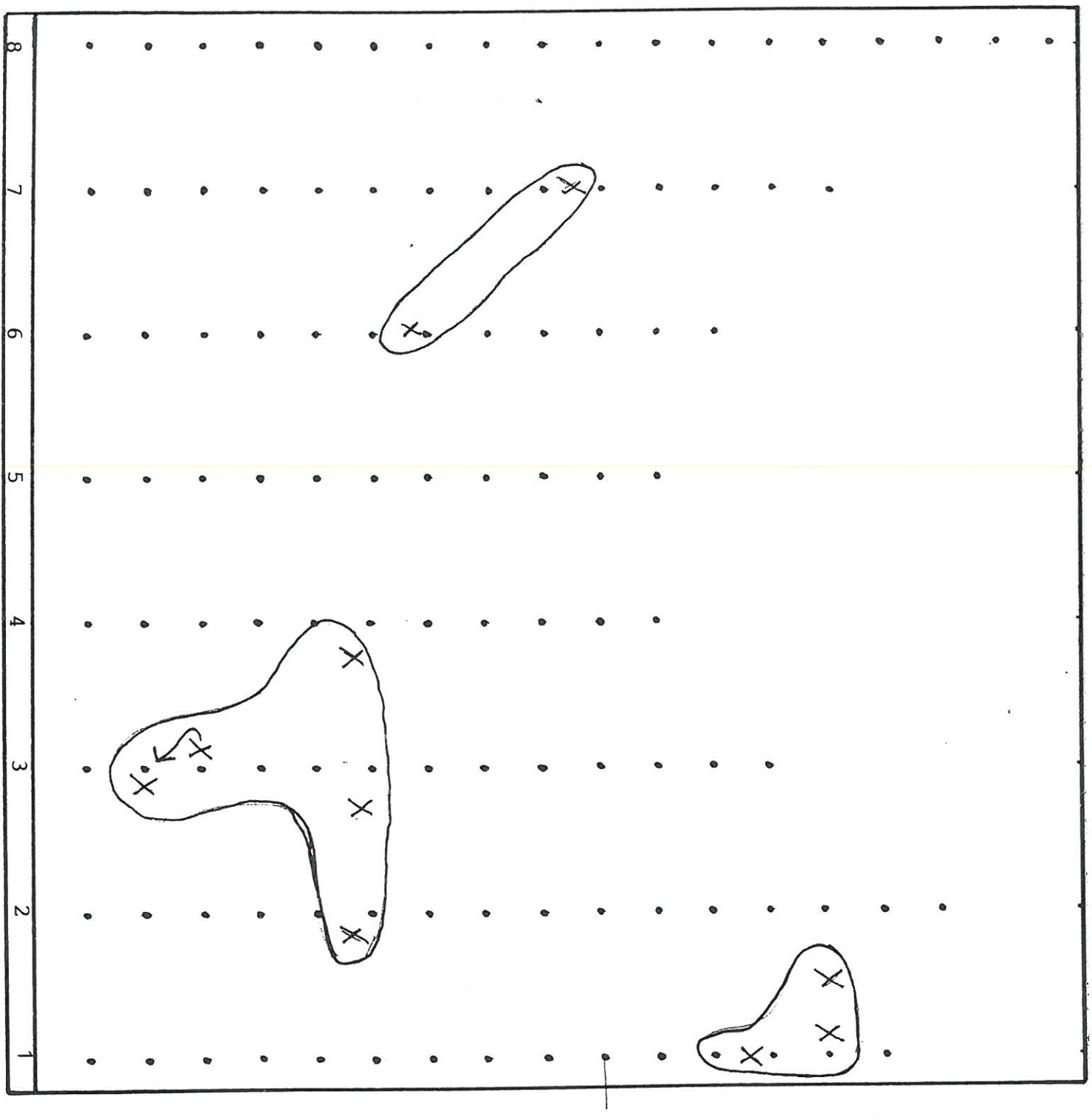
Brown-headed Cowbird



Scarlet Tanager

Scale

1 in. = 50 m
1 cm = 20 m

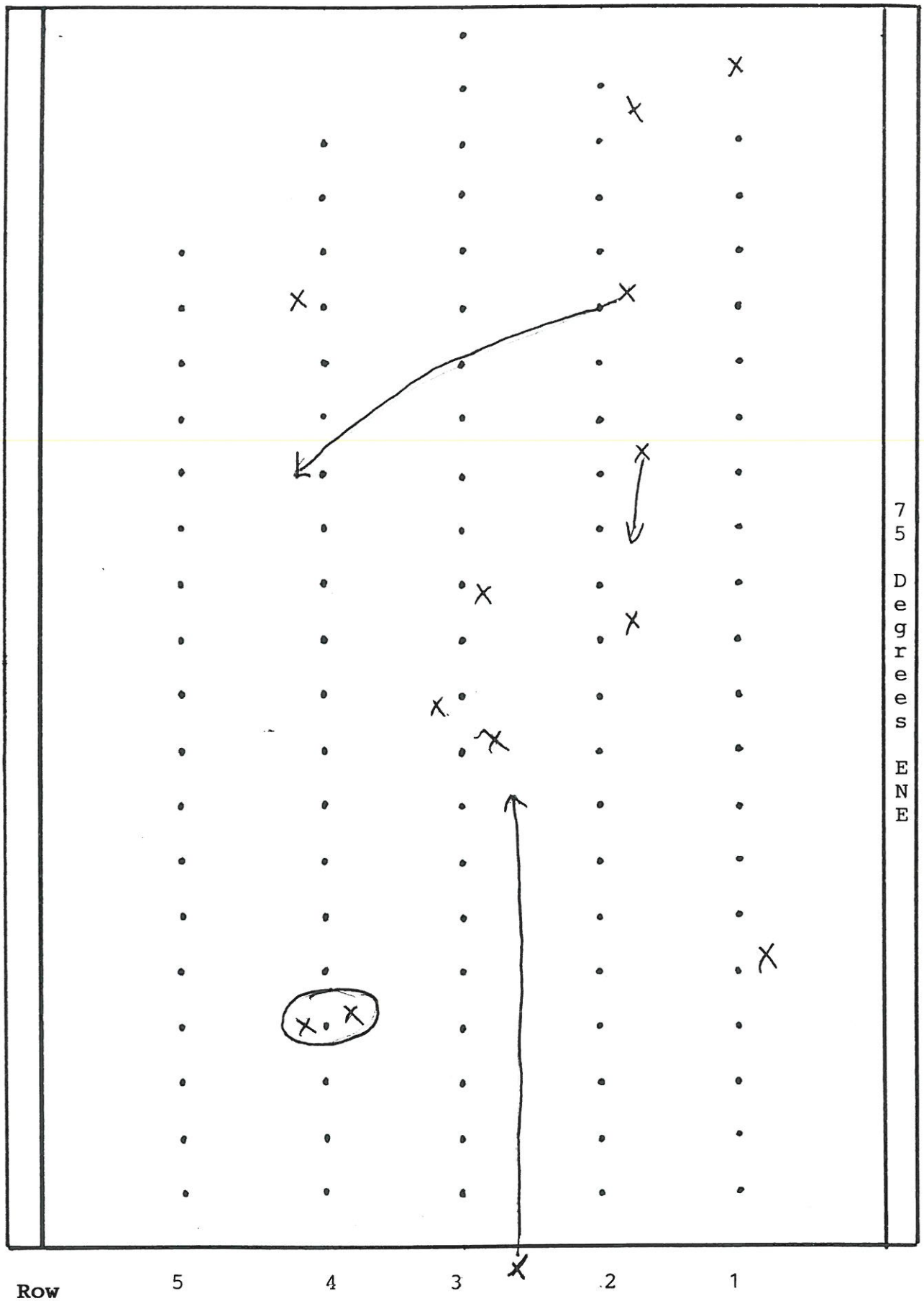


Summer Tanager

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2

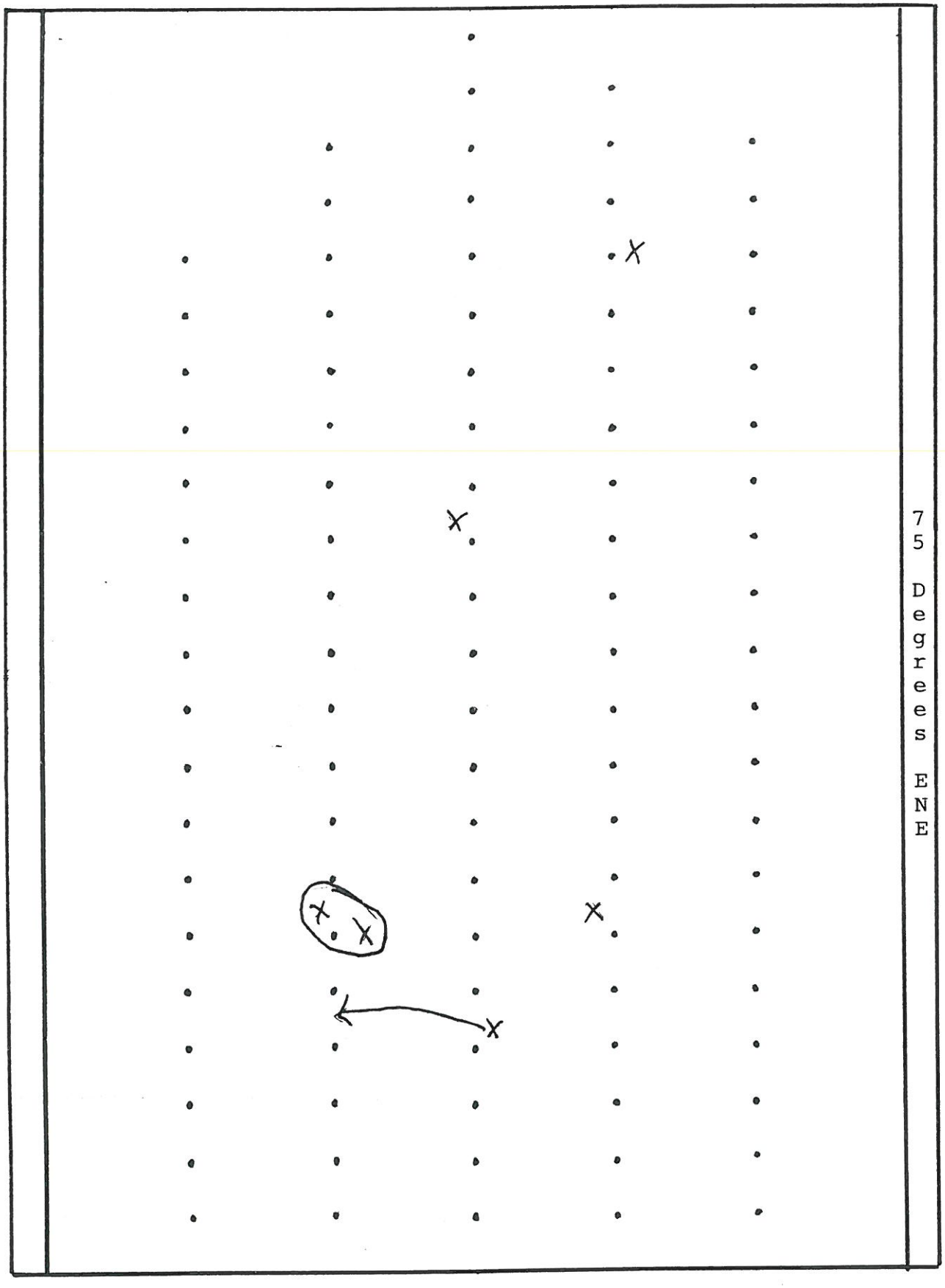


Red-bellied Woodpecker

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



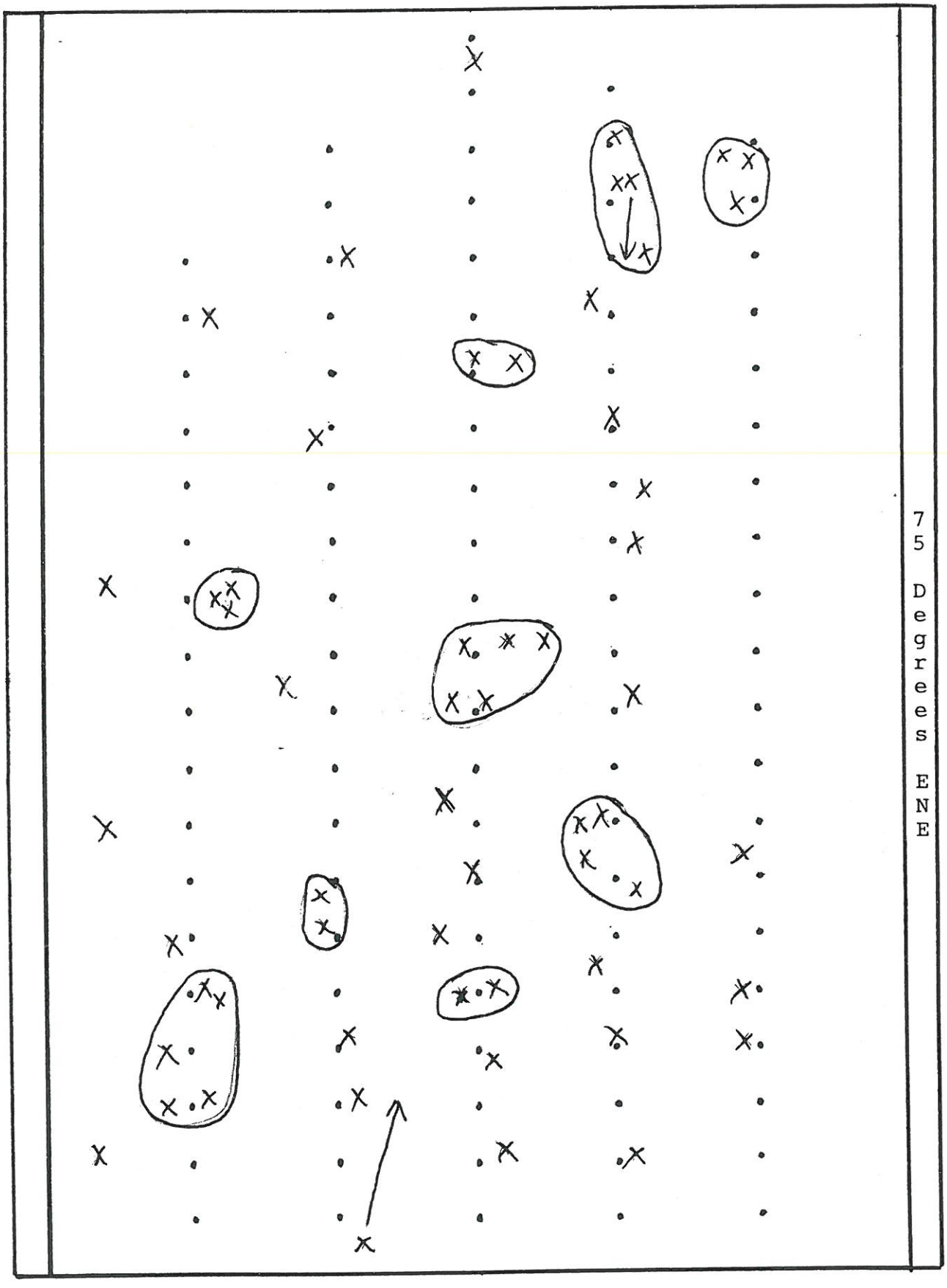
Row 5 4 3 2 1

Downy Woodpecker

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



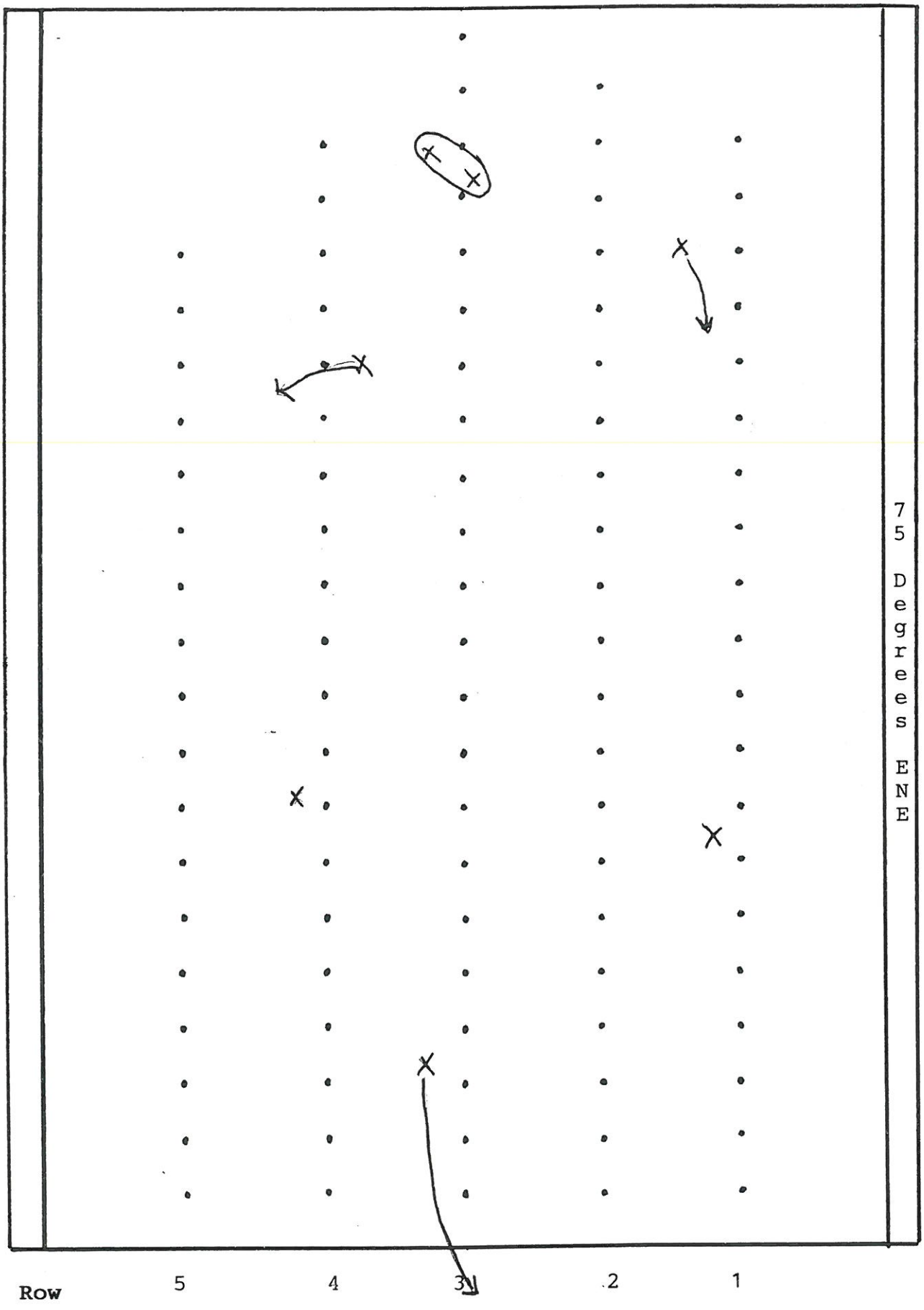
Row 5 4 3 2 1

Eastern Wood-Pewee

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2

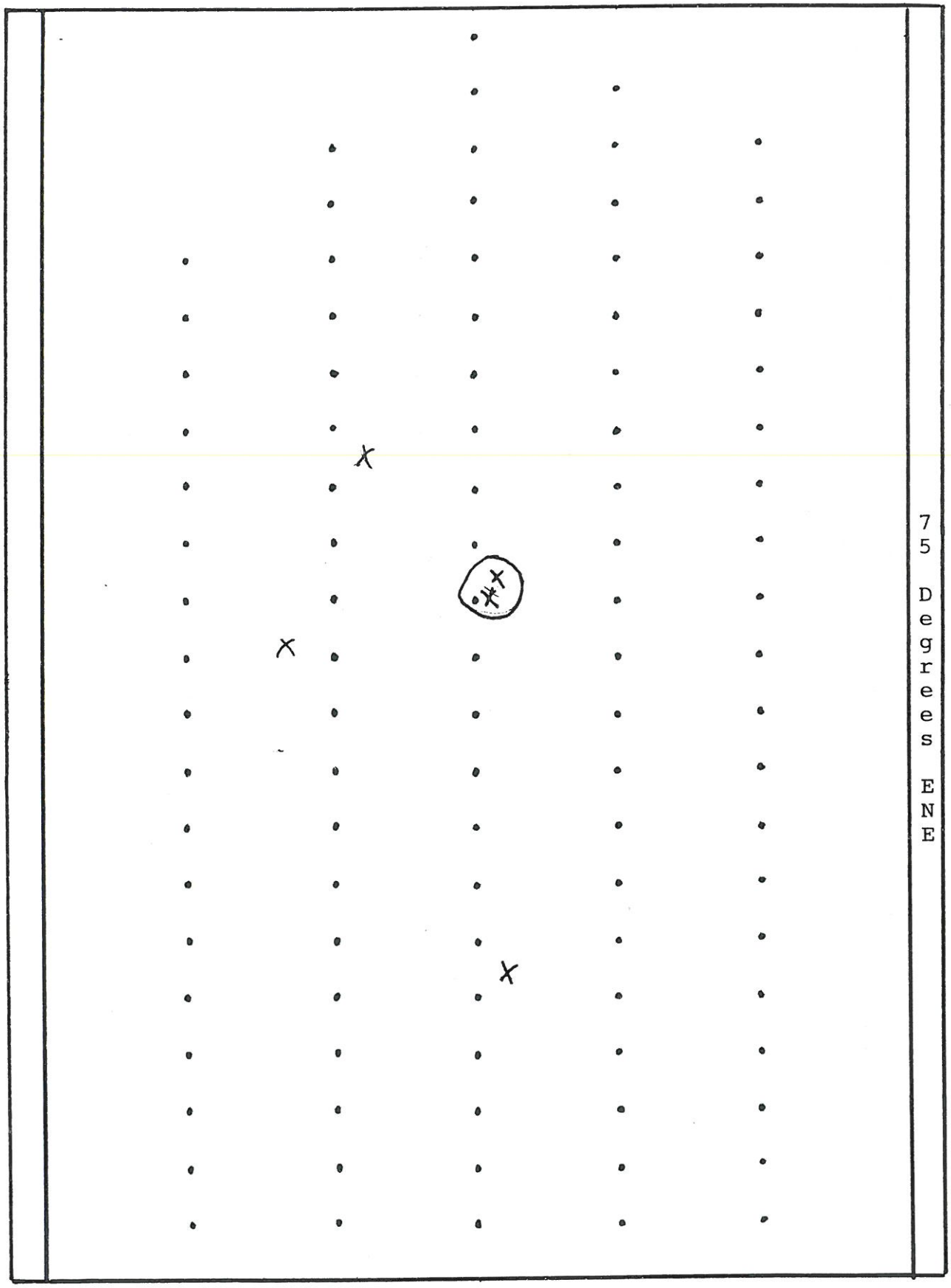


Blue Jay

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2

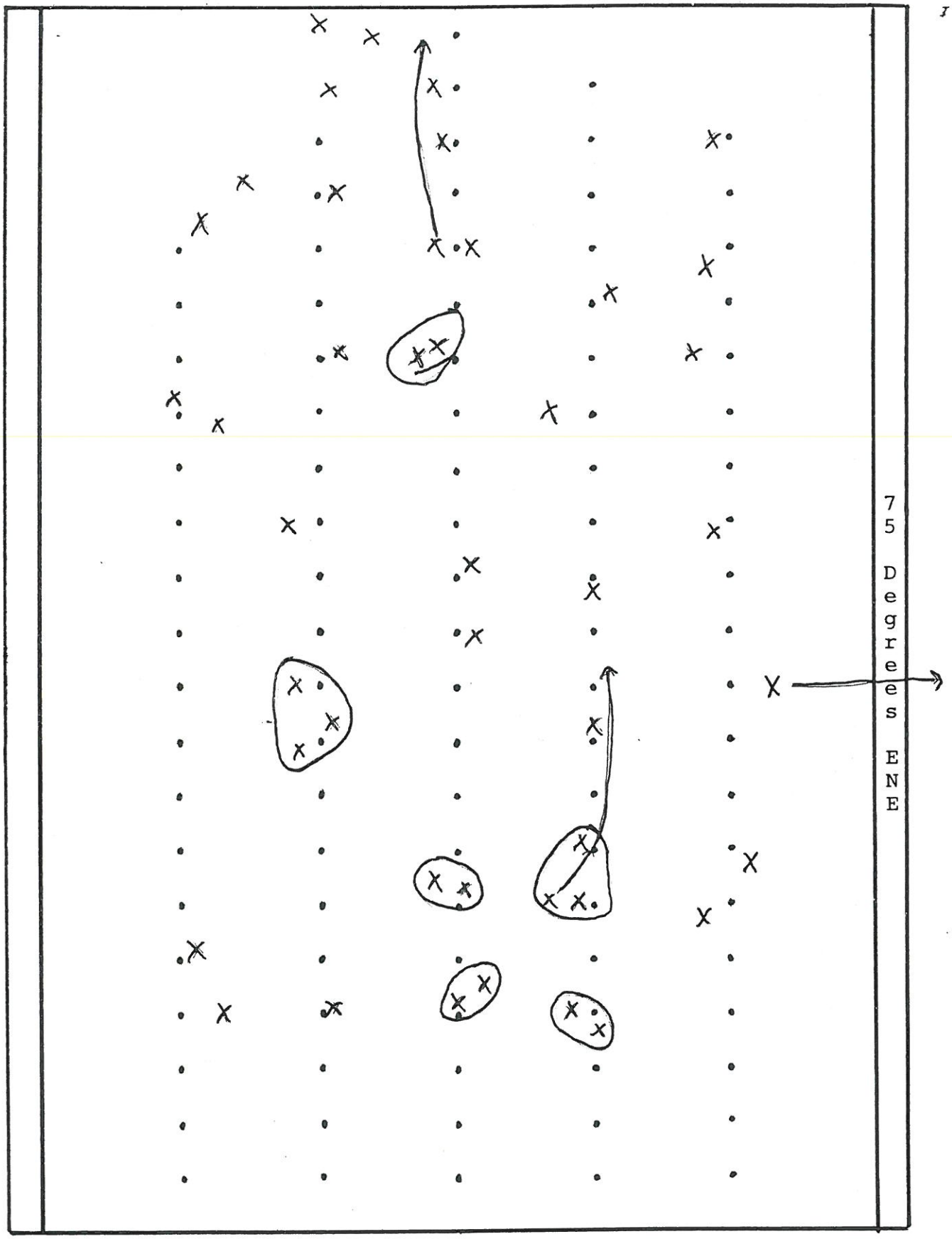


American Crow

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



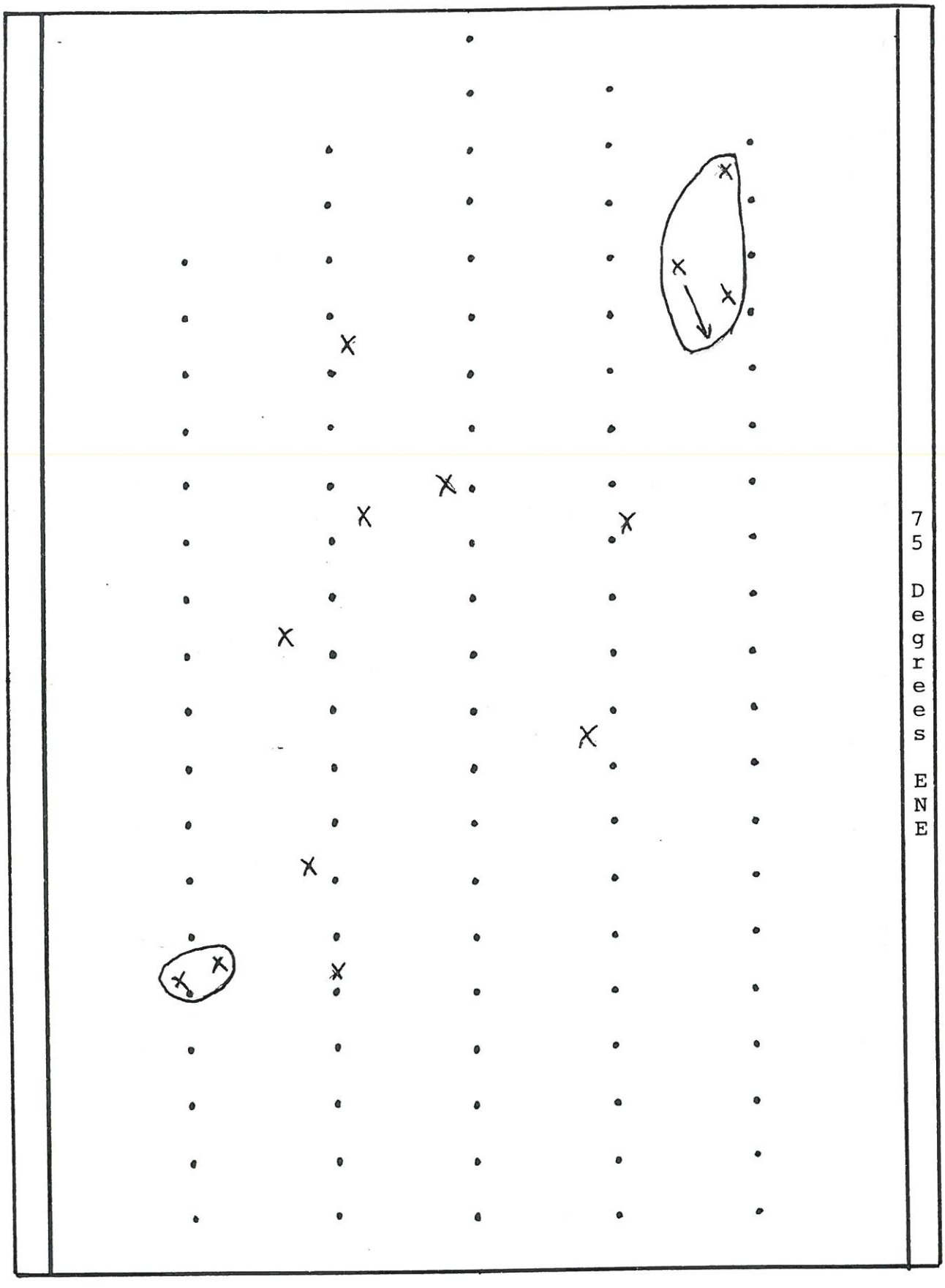
Row 5 4 3 2 1

Tufted Titmouse

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



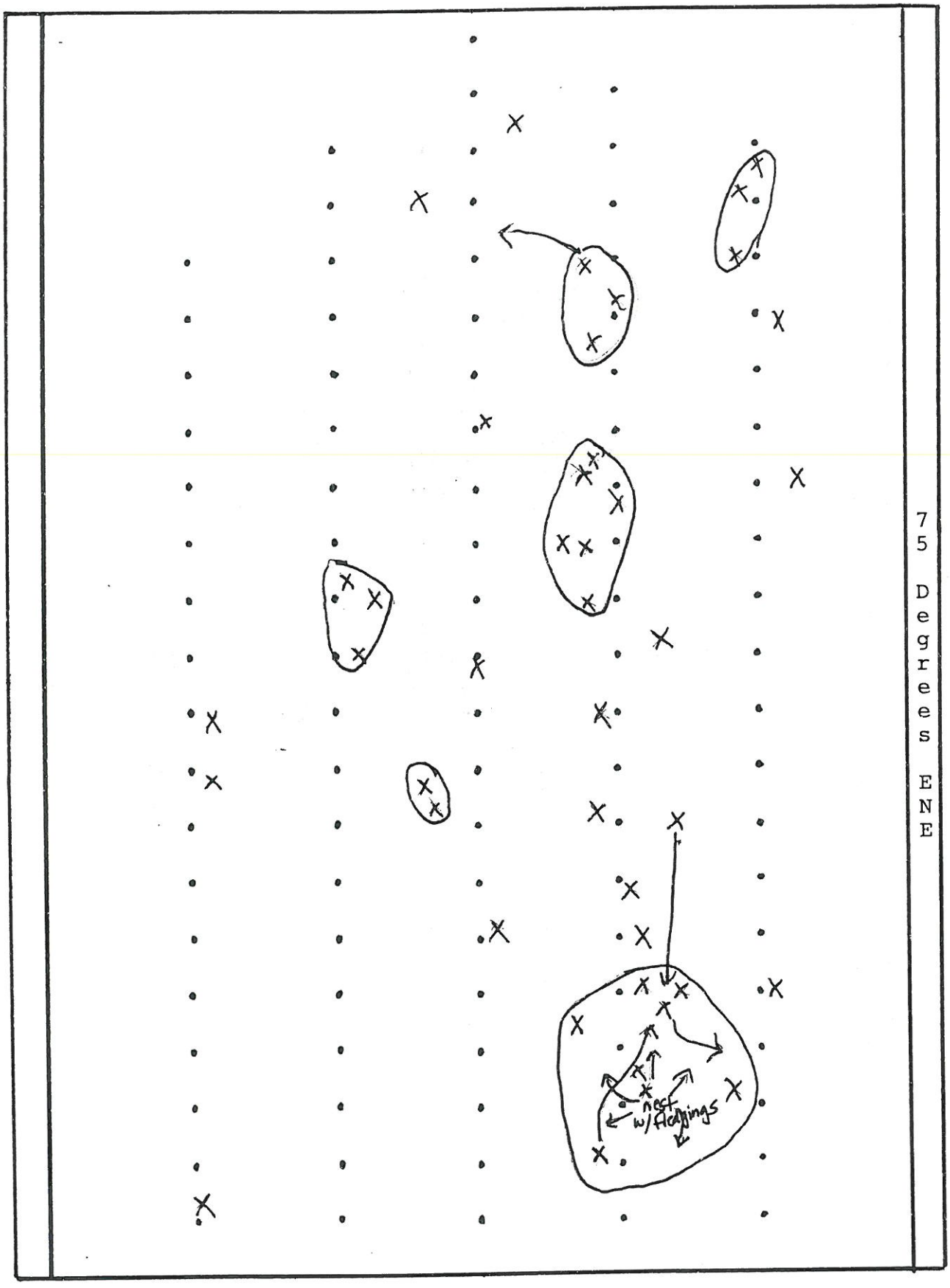
Row 5 4 3 2 1

Carolina Chickadee

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



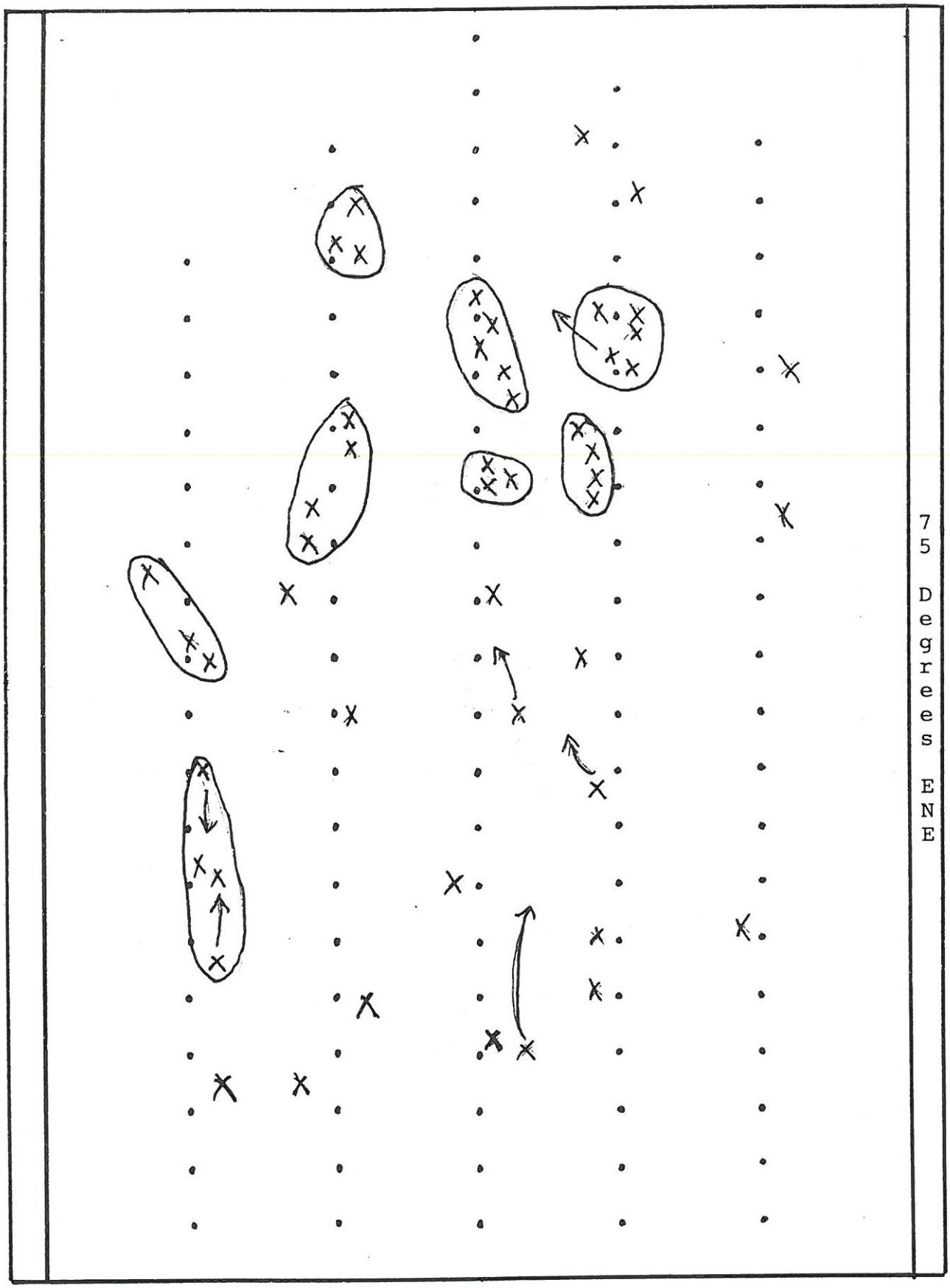
Row 5 4 3 2 1

Carolina Wren

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



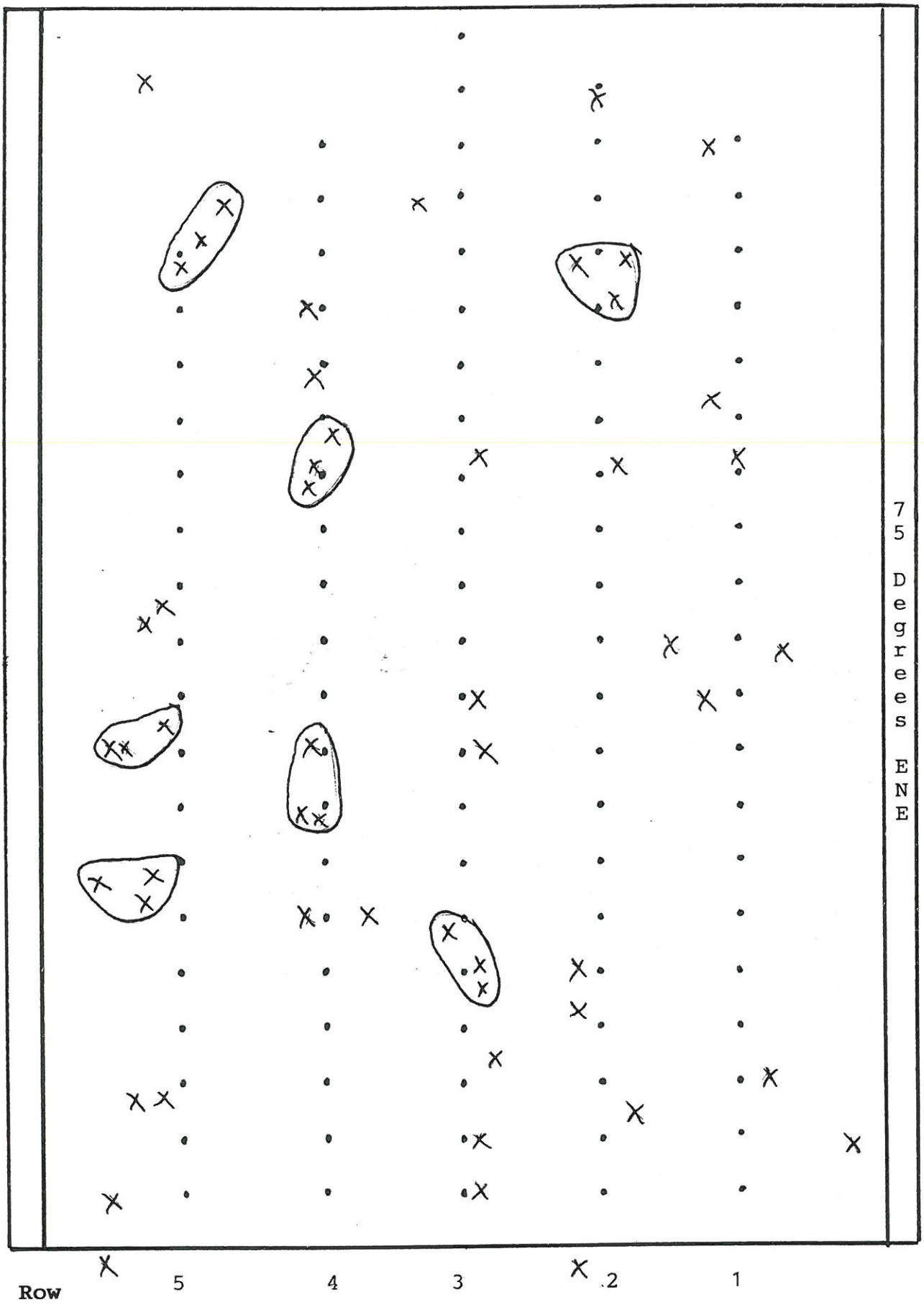
Row 5 4 3 2 1

Blue-gray Gnatcatcher

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2

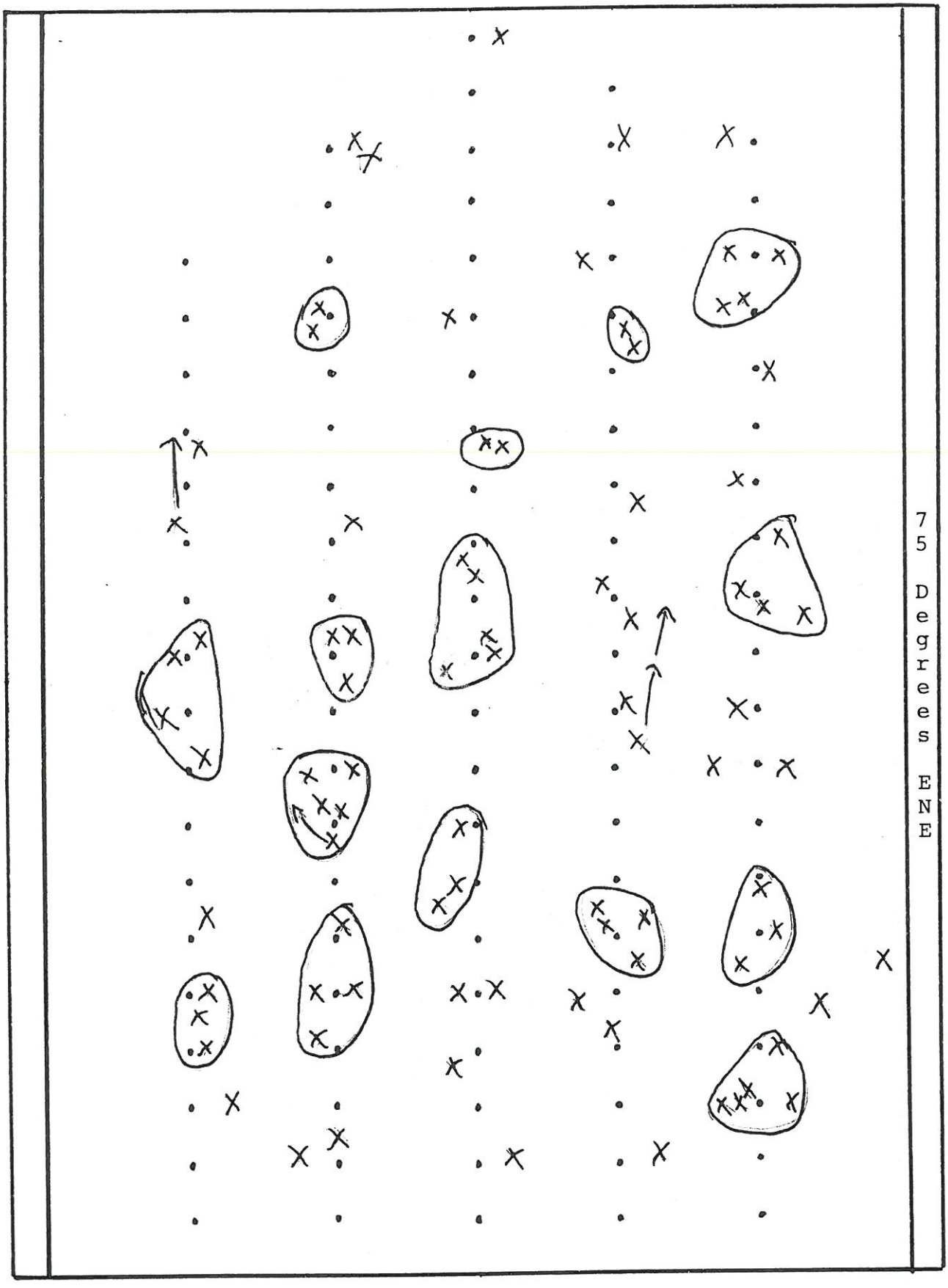


Red-Eyed Vireo

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



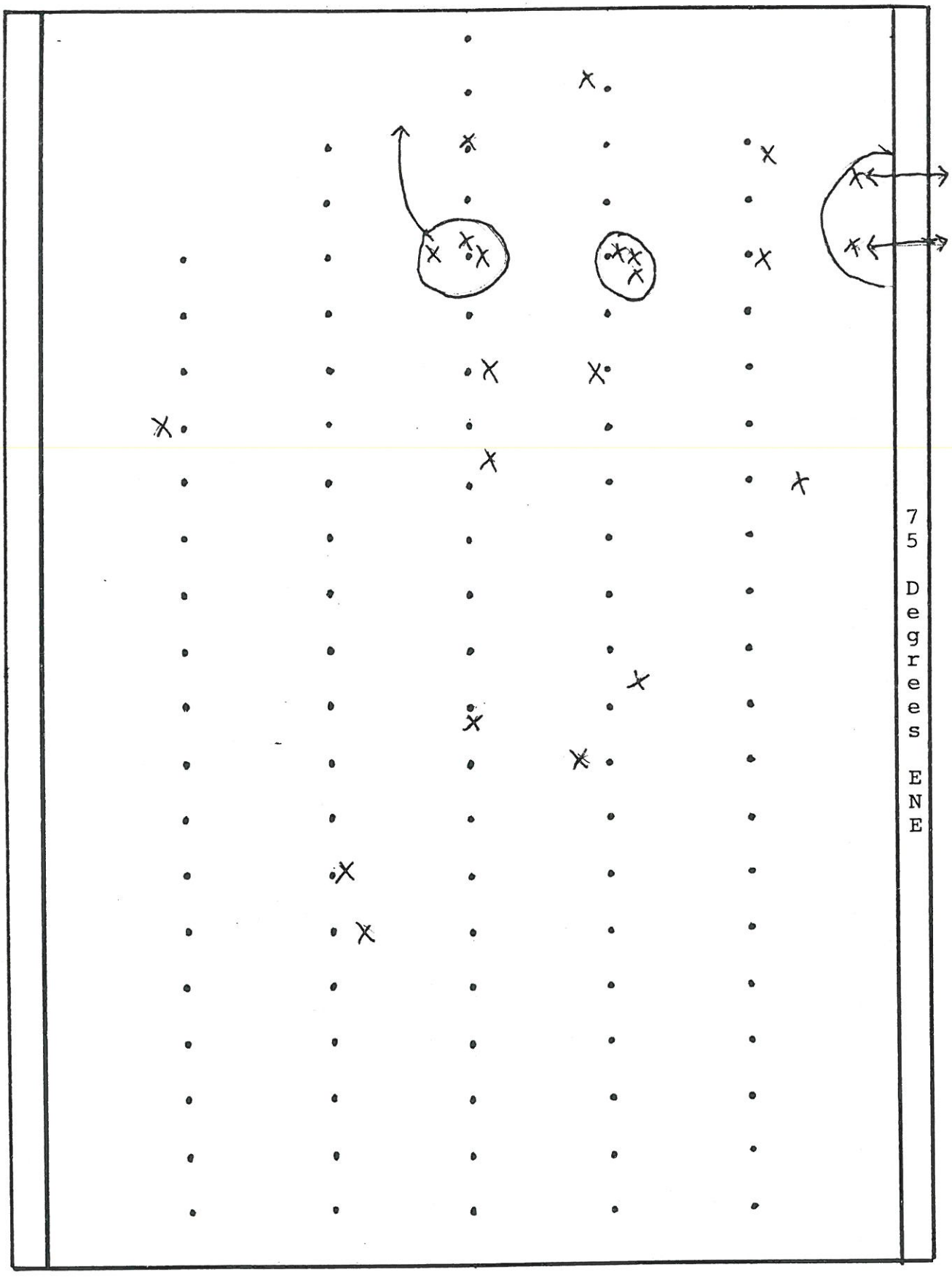
Row 5 4 3 2 1

Prairie Warbler

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



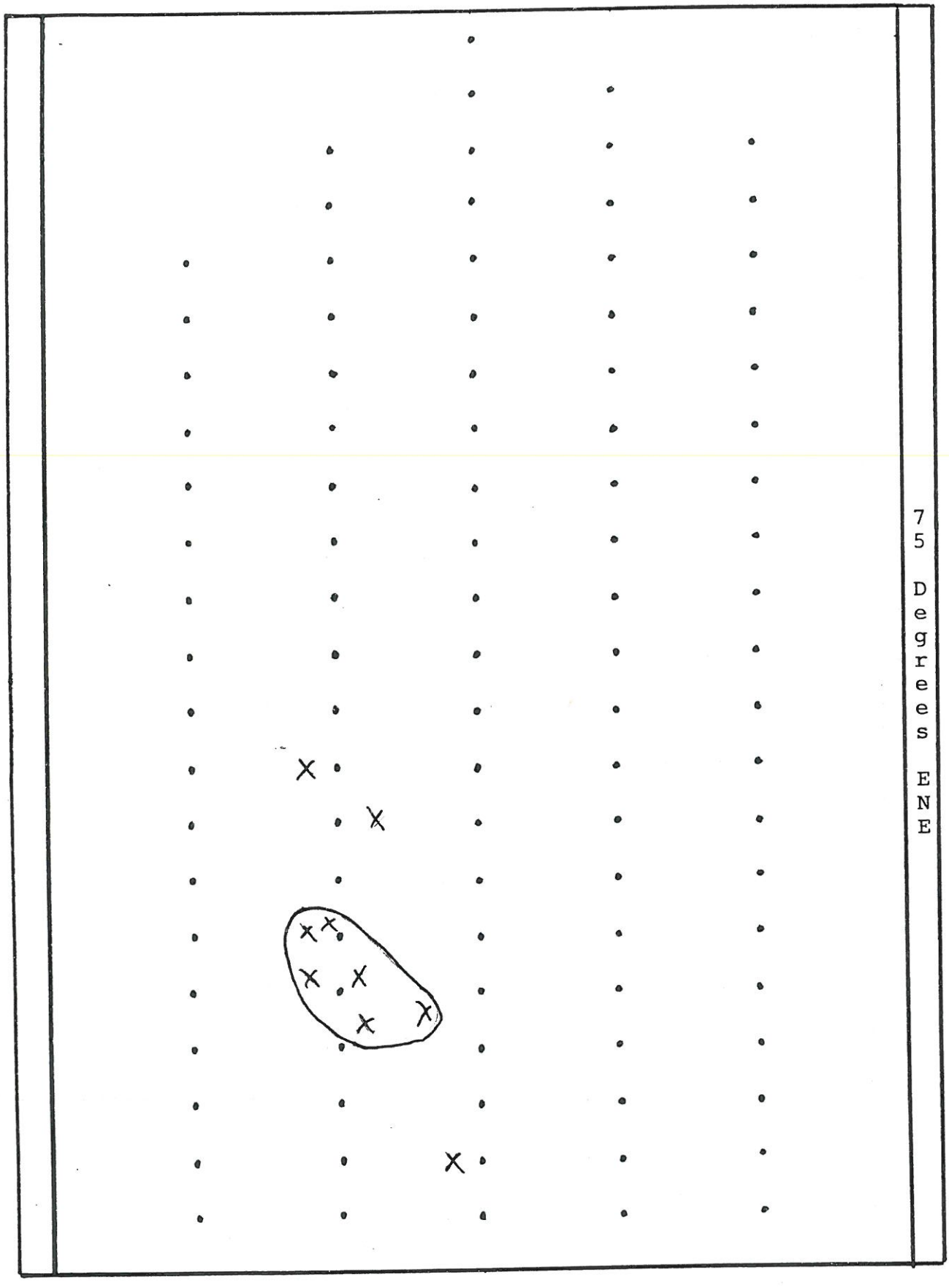
Row 5 4 3 2 1

Hooded Warbler

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2

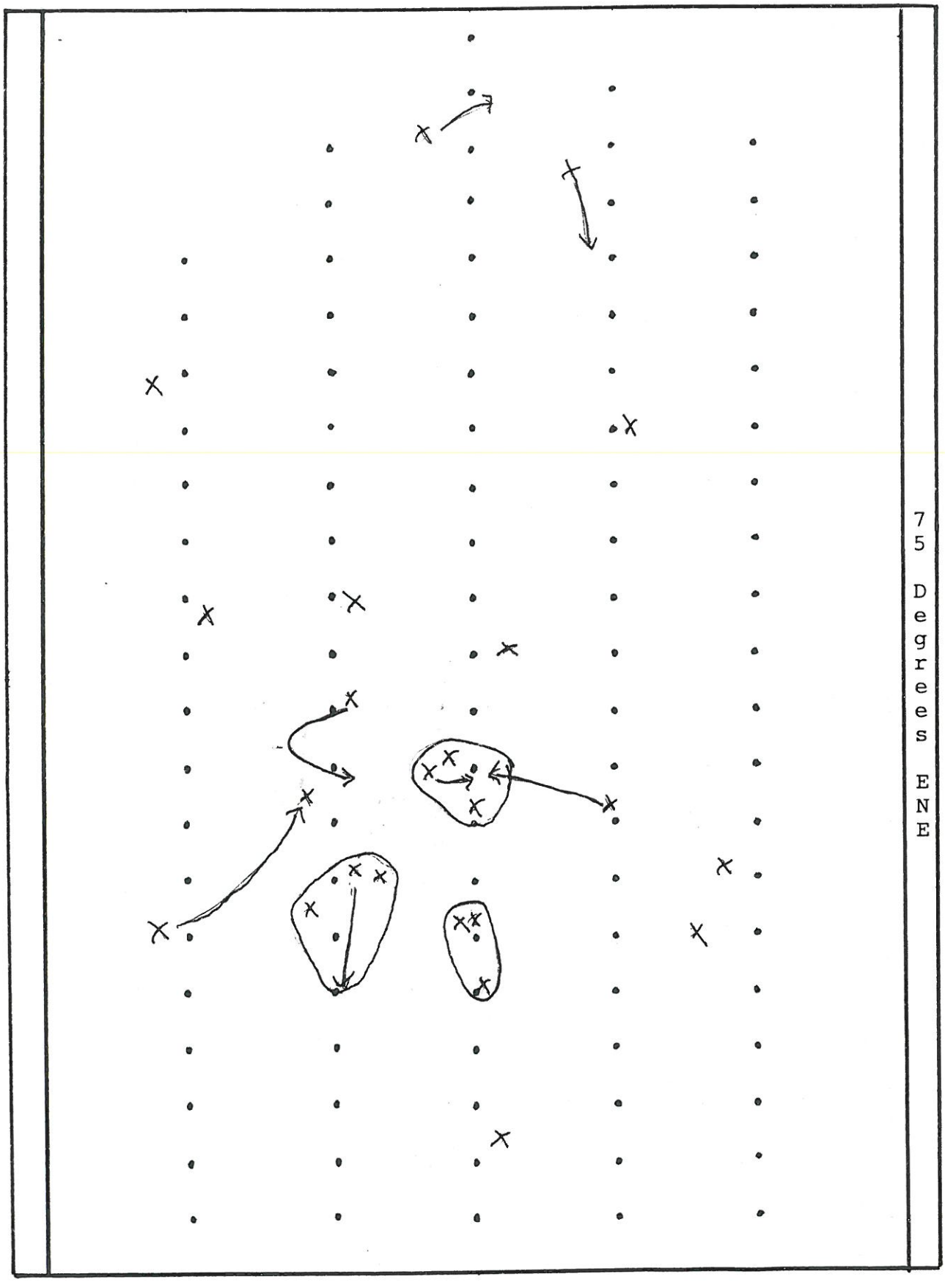


Common Yellowthroat

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



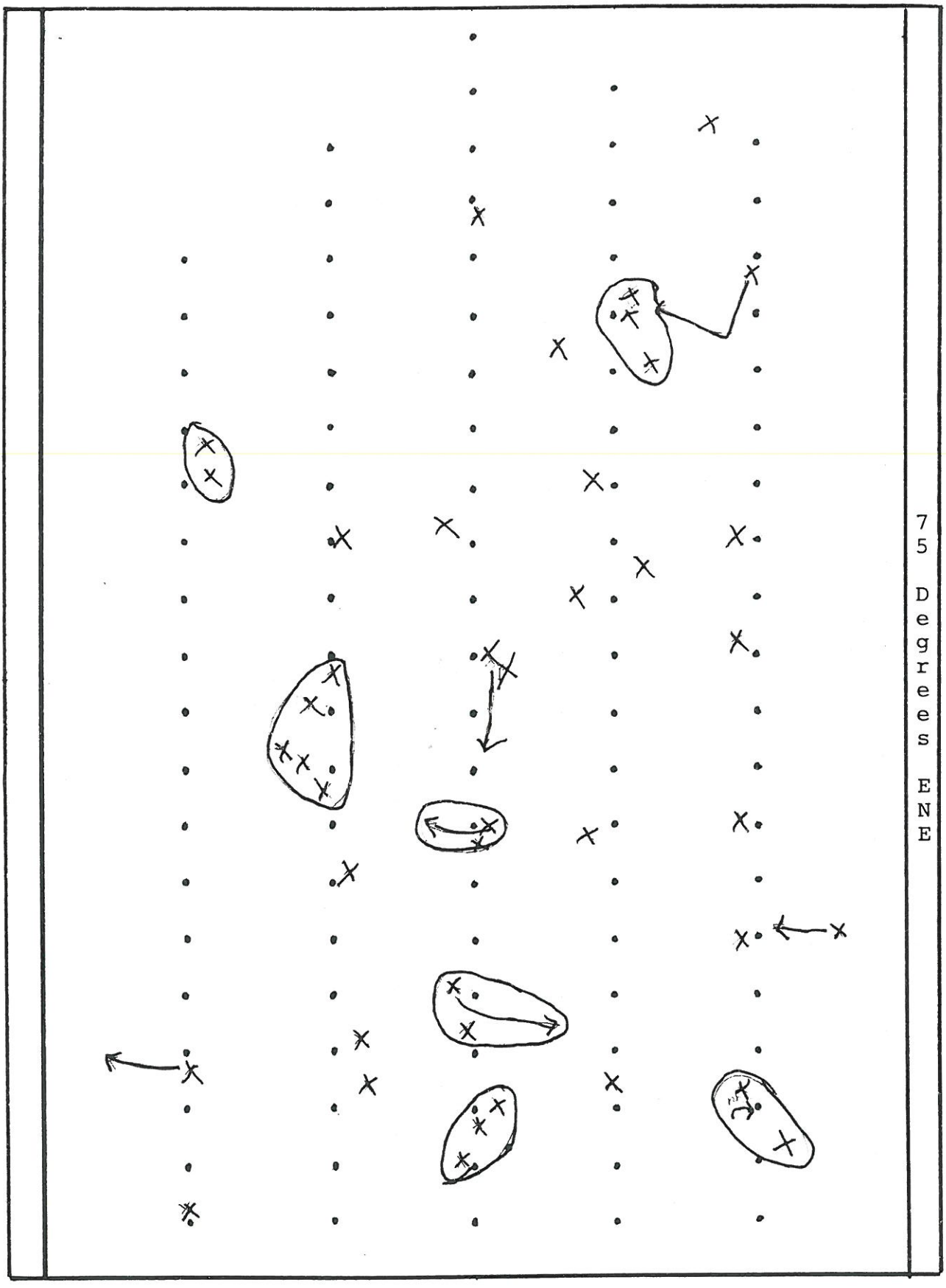
Row 5 4 3 2 1

Yellow-breasted Chat

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



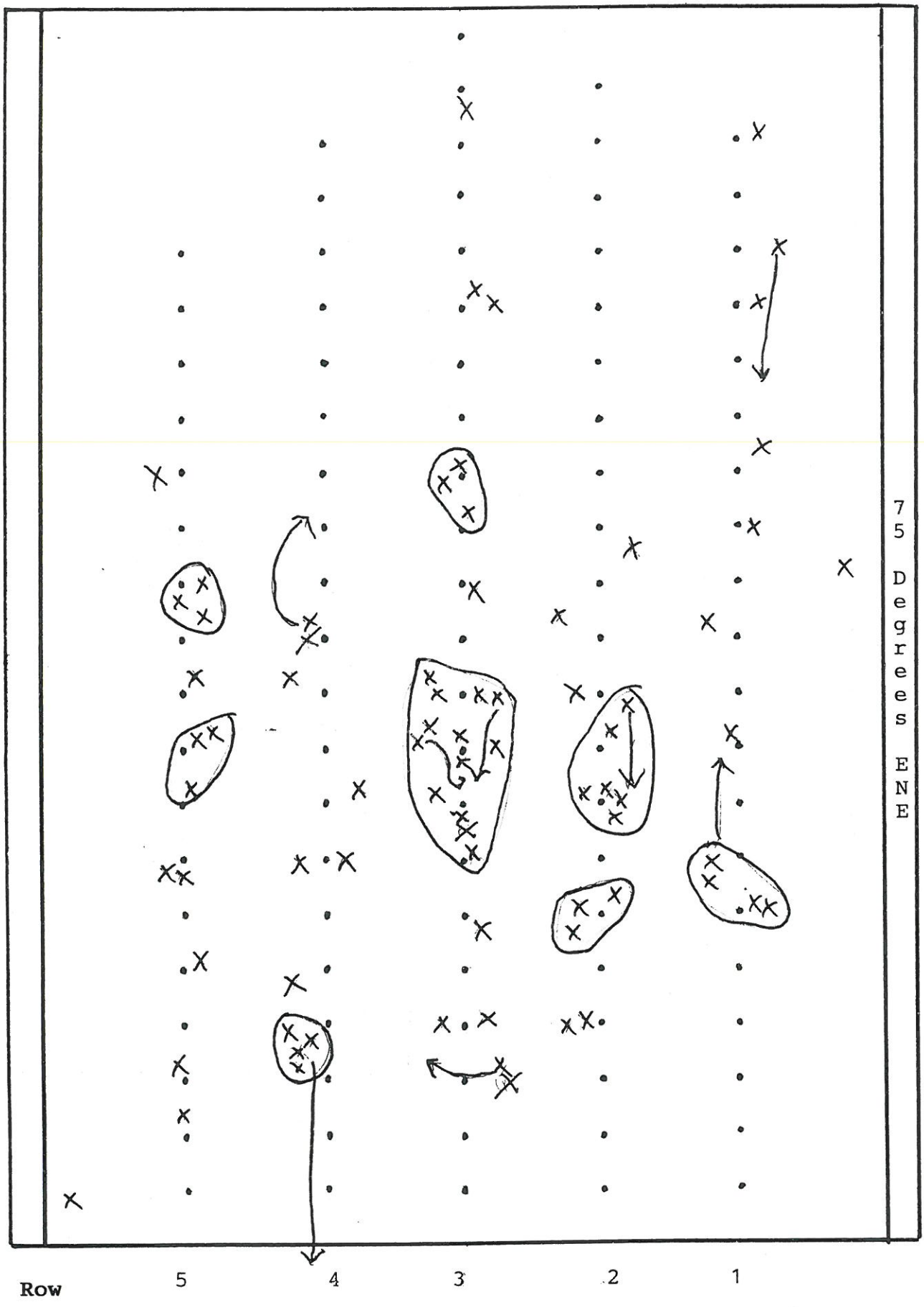
Row 5 4 3 2 1

Indigo Bunting

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2

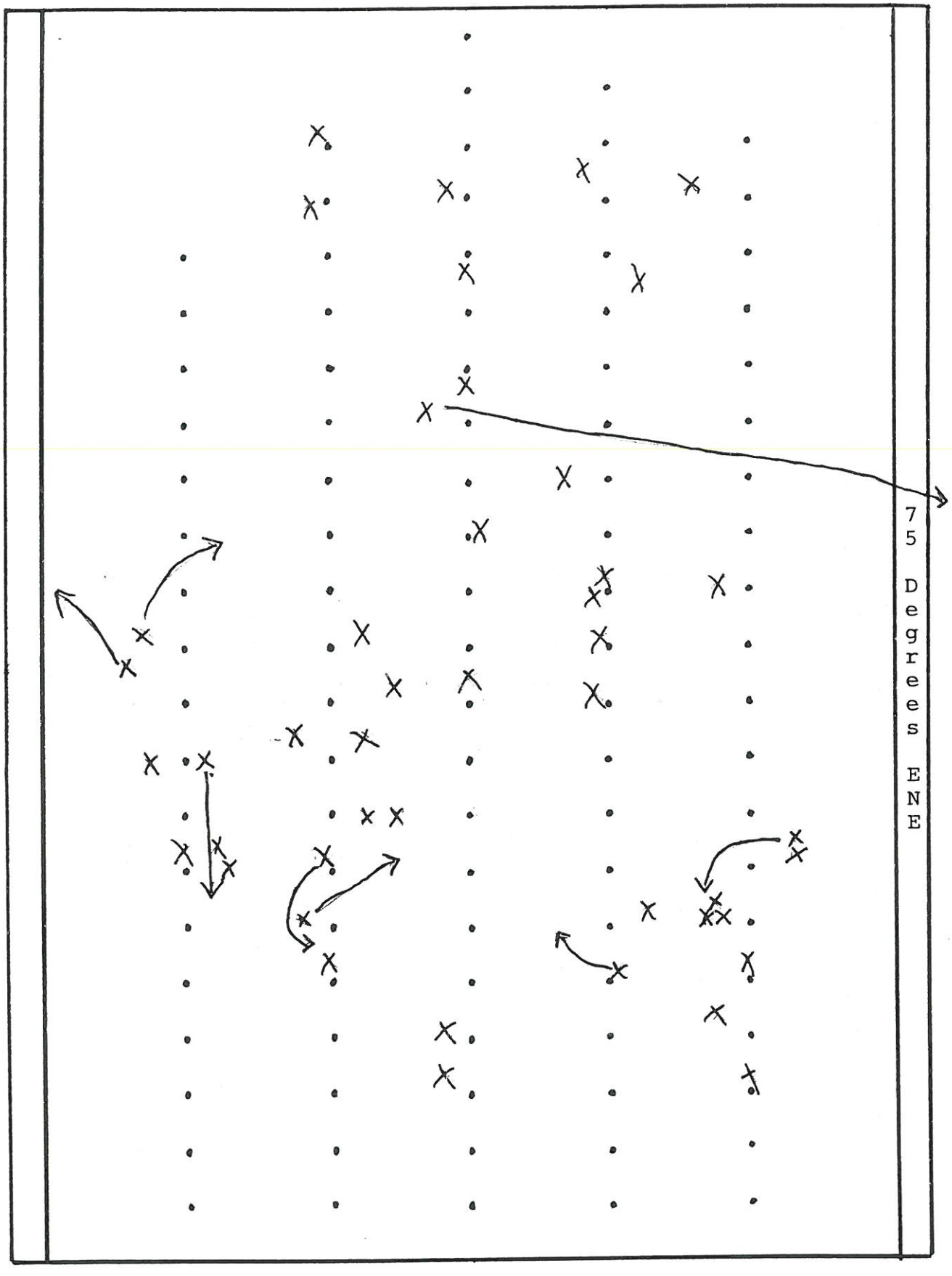


Rufous-sided Towhee

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2

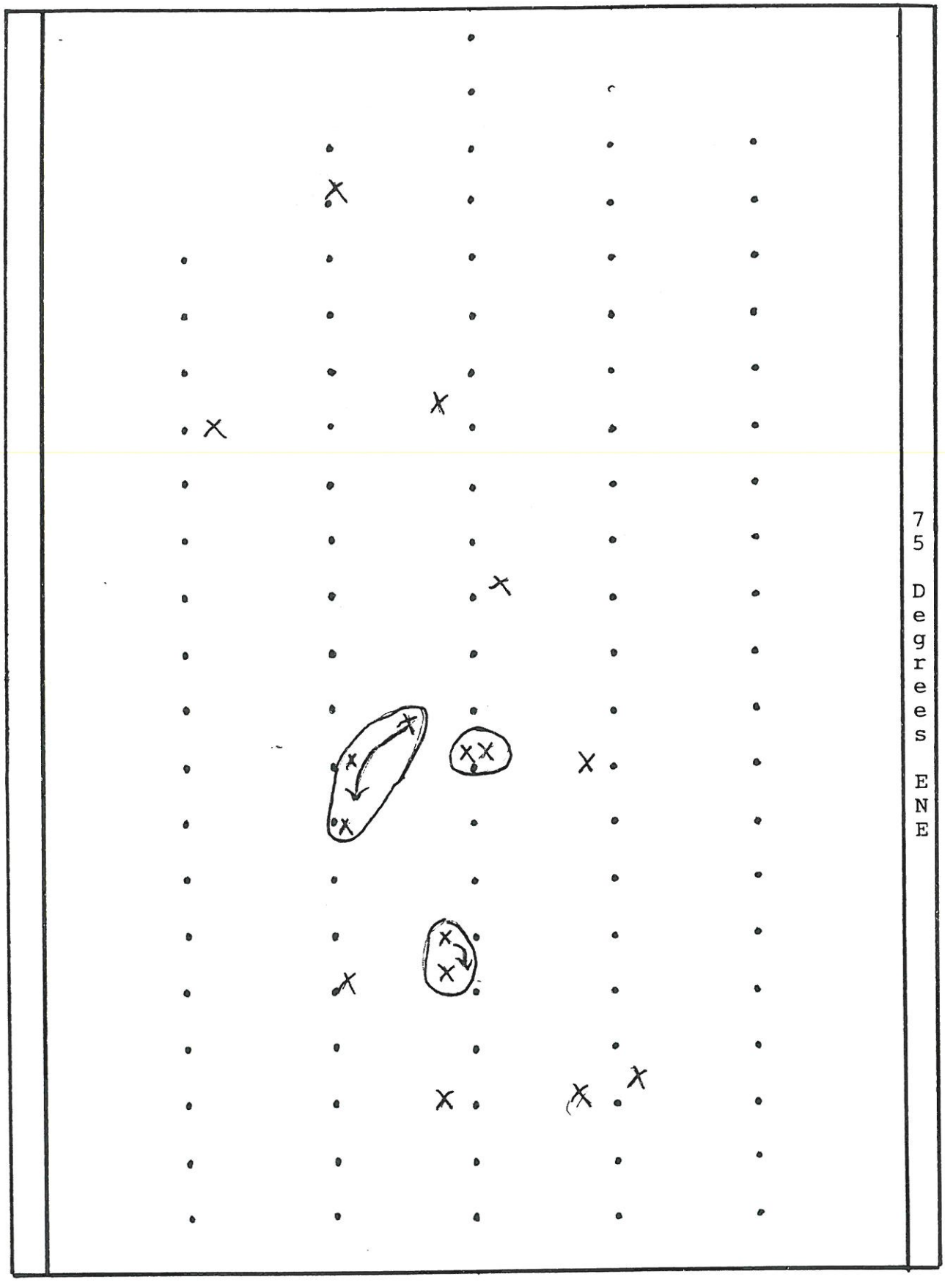


Brown-headed Cowbird

Scale

1 in. = 50 m
1 cm = 20 m

Loth Forest
Plot 2



Row 5 4 3 2 1

Summer Tanager

Scale

1 in. = 50 m
1 cm = 20 m

Appendix IV

This appendix contains the formulas that were used for the vegetation analysis. The field data sheets from the vegetation analysis are also located in this appendix.

Appendix IV: Formulas Used for Vegetation Analysis

1. **Density** is the number per unit area.

2. Total trees counted by X 2 if 5 circles
   16 if 6 circles
   14 if 7 circles
   13 if 8 circles
   11 if 9 circles
   10 if 10 circles

3. **Relative density** is the percent of total number o f trees which are the species in question:

   $$\frac{\text{number of trees of the species}}{\text{total number of trees of all species}}$$

4. **Circumference** was determined by:

   C=diameter^2 (.7854) for each tree species

5. **Basal Area** is the cross sectional area of the trunk of a tree 4.5 feet (dbh)

6. Add the total circumference of each size class to give the basal area for each tree's size class.

7. $$\frac{\text{Total basal area of the species}}{\text{Total basal area of all species}}$$

8. **Frequency** indicates the evenness of distribution of a species

9. $$\frac{\text{Number of circles in which the species occurred}}{\text{Total number of circles}}$$

10. **SHRUBS**: Total shrub stems in all transects (2 per circle) X100, divided by the number of transects.

11. **GROUND COVER**: Total pluses (+) recorded (20 sightings per circle) X 100, divided by the total number of sightings = % ground cover.

12. **CANOPY COVER**: Total pluses (+) recorded (20 sightings per circle) X 100, divided by the total number of sightings = % canopy cover.

Reproduced from McDonald 1997

Vegetation Data Sheet

Plot Location: Kynitel Surveyor's Name: Sally/Patrick/Pam

Date: 9/7/99

Circle Center Location: Row 5, #14

Tree Identification

Species	Diameter in (cm)									
1. Chestnut Oak	51	43	7	54	52					
2. Sourwood	8									
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Virginia Pine	1	1		0
2. Chestnut oak	1	1		0
3. Red Maple	111	3	++++	5
4. Pignut Hickory		0		0
5. Sassafrass		0	1	1
6. Sourwood		0	1	1
7.		0	1	1
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
-+-++++++	--+-++++--

Canopy Cover

Transect #1	Transect #2
++++++++++	--+++++++++

Vegetation Data Sheet

Plot Location: Kynitel Surveyor's Name: Sally / Patrick / Pam

Date: 9/7/99

Circle Center Location: Row 4, #10

Tree Identification

Species	Diameter in (cm)
1. Pignut Hickory	29
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Sour Gum	III	3	++++ ++++ I	11
2. Tulip Poplar	II	2		0
3. Red Bud	I	1	I	1
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
- + - + + + + + + +	- + + + + + - + + +

Canopy Cover

Transect #1	Transect #2
+ - - + + + + - - -	- - - + + + + + + + +

Vegetation Data Sheet

Plot Location: Kynite 1 Surveyor's Name: Sally / Patrick / Pam

Date: 9/7/99

Circle Center Location: Row 5, #8

Tree Identification

Species	Diameter in (cm)
1. Chestnut Oak	51
2. White Oak	25
3. Red Oak	9
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple		0	1	1
2. Sour Gum	1	1	1	1
3. Pignut Hickory		0	1	1
4. Chestnut Oak	1111	4	𝍸 𝍸 𝍸 𝍸	20
5. Sourwood		0	11	2
6. Dogwood	11	2		0
7. White Oak	1	1		0
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ - - - + + + + + +	+ + - + + + + + - -

Canopy Cover

Transect #1	Transect #2
+ + + + + + + - - -	+ + + + + - - - - -

Vegetation Data Sheet

Plot Location: Kynite 1 Surveyor's Name: Sally / Patrick / Pam

Date: 9/7/99

Circle Center Location: Row 5, #3

Tree Identification

Species	Diameter in (cm)									
1. Chestnut Oak	37	33	61	12	10	48	10			
2. White Oak	34									
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Chestnut Oak	𝍸 𝍸 𝍸 𝍸 𝍸 | | |	28	𝍸 |	6
2. Red Oak			|	|
3. Dogwood			|	|
4. White Oak			|	|
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ + + + - - + + - +	+ + + + + - + - + +

Canopy Cover

Transect #1	Transect #2
- - + + + + + + + +	- + - - - + + + + +

Vegetation Data Sheet

Plot Location: Kynite 1 Surveyor's Name: Sally / Patrick / Pam

Date: 9/7/99

Circle Center Location: Row 3, #12

Tree Identification

Species	Diameter in (cm)
1. White Oak	80
2. Pignut Hickory	52
3. Red Cedar	29
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Sourwood	1	1		0
2. Red Bud	1	1		0
3. Tulip Poplar	1	1		0
4. Sour Gum		0	11	2
5. Ash		0	1	1
6. Smooth Sumac		0	1	1
7. Pignut Hickory		0	1	1
8. Elm		0	1	1
9.				
10.				

Ground Cover

Transect #1	Transect #2
+++ - +++++	++++ - ++++

Canopy Cover

Transect #1	Transect #2
++++++++++	++++++ +++ +

Vegetation Data Sheet

Plot Location: Kynite 1 Surveyor's Name: Sally / Patrick / Pam

Date: 9/7/99

Circle Center Location: Row 2, #16

Tree Identification

Species	Diameter in (cm)									
1. Chestnut Oak	49	36								
2. White Oak	48									
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	+++ |||	8	+++ |||	8
2. Sourwood	|	1	||	2
3. Tulip Poplar			|	1
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
++++ + - ++++	++ - +++++ - +

Canopy Cover

Transect #1	Transect #2
++++ - - - +++	++++++++++

Vegetation Data Sheet

Plot Location: Kynite 1 Surveyor's Name: Sally / Patrick / Pam

Date: 9/7/99

Circle Center Location: Row 3, #15

Tree Identification

Species	Diameter in (cm)
1. Chestnut Oak	59
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Sourwood	III	3	I	1
2. Red Bud		0	III	3
3. Tulip Poplar		0	II	2
4. Sour Gum		0	II	2
5. Red Maple	III	3		0
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
++++++++++	++-+++++++

Canopy Cover

Transect #1	Transect #2
--+++++++++	+++++++-+-+

Vegetation Data Sheet

Plot Location: Kynite 1 Surveyor's Name: Sally / Patrick / Pam

Date: 9/7/99

Circle Center Location: Row 2, #11

Tree Identification

Species	Diameter in (cm)
1. White Oak	7
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	~~HHH HHH~~	10	III	3
2. Sour Gum	IIII	4	III	3
3. Sourwood	IIII	4		0
4. Chestnut Oak	I	1		0
5. SWEET Cherry	I	1		0
6. Pignut Hickory			II	2
7. Tulip Poplar			I	1
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ - +++++++-	-++++++-+++

Canopy Cover

Transect #1	Transect #2
-+++++++---	++++++----

Vegetation Data Sheet

Plot Location: Kynite 1 Surveyor's Name: Sally / Patrick / Pam

Date: 9/7/99

Circle Center Location: Row 1, #10

Tree Identification

Species	Diameter in (cm)
1. Scarlet Oak	06
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	IIII	4	++++	5
2. Sour Gum	I	1		
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
- - - + - + + + - +	- + + + + + + + + -

Canopy Cover

Transect #1	Transect #2
- + + + + + + + - -	- - + + + + + + - + +

Vegetation Data Sheet

Plot Location: Kynite 2 Surveyor's Name: Pam/Greg

Date: 9/8/99

Circle Center Location: Row 1, #9

Tree Identification

Species	Diameter in (cm)									
1. Red Oak	40	30	42							
2. White Oak	46									
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Tulip Poplar	III		I	
2. Red Maple	II		++++ ++++ III	
3. Ash	I			
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
- - - - + + - + + +	- - - + + + + - - +

Canopy Cover

Transect #1	Transect #2
+ + + + - - + - - -	+ + + - - - - - + + +

Vegetation Data Sheet

Plot Location: Kynite 2 Surveyor's Name: Pam | Greg

Date: 9/8/99

Circle Center Location: Row 1, #3

Tree Identification

Species	Diameter in (cm)
1. Red Oak	52
2. Sour Gum	9
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Sourgum	1	1	++++ ||||	9
2. Tulip Poplar		0	+++	5
3. Red Maple	+++ +++ +++ +++	20	+++ +++ ||	12
4. Ironwood			1	1
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ - + + + - + + + - +	+ - - - + - - - + +

Canopy Cover

Transect #1	Transect #2
+ + - - - - - - - + -	+ + + + + + - - - +

Vegetation Data Sheet

Plot Location: Kynite 2 Surveyor's Name: Sally Patrick

Date: 9/8/99

Circle Center Location: Row 4, #8

Tree Identification

Species	Diameter in (cm)
1. American Beech	58
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Pignut Hickory	III	3		0
2. Redbud	II	2	I	1
3. Dogwood	I	1		0
4. Sourwood			++++ ++++	10
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
--+--+--+-	-+++++-+++

Canopy Cover

Transect #1	Transect #2
++++++---+	---++++++++

Vegetation Data Sheet

Plot Location: Kynite 2 Surveyor's Name: Sally / Patrick

Date: 9/8/99

Circle Center Location: Row 5 #9

Tree Identification

Species	Diameter in (cm)									
1. White Oak	54	40								
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	IIII III	8		
2. Sumac		0	II	2
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
--+-++++-+	++++++-----

Canopy Cover

Transect #1	Transect #2
+-+++-++++	+++++-+++-

Vegetation Data Sheet

Plot Location: Kynite 2 Surveyor's Name: Sally Patrick

Date: 9/8/99

Circle Center Location: Row 4 # 8

Tree Identification

Species	Diameter in (cm)									
1. White Oak	54	57								
2. Sour Gum	7									
3. Red Maple	45									
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Tulip Poplar		0	1	1
2. Sour Wood	1	1	1	1
3. Sour Gum	1	1	1	1
4. Red Maple	++++	5	++++	4
5. Sumac	1	1		
6. Iron Wood	1	1		
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
-+--- -+-+-	-++ --++ -++

Canopy Cover

Transect #1	Transect #2
++++++++++	++++++++++

Vegetation Data Sheet

Plot Location: Kynite 2 Surveyor's Name: Sally Patnck

Date: 9/8/99

Circle Center Location: Row 3, #2

Tree Identification

Species	Diameter in (cm)									
1. Scarlet Oak	66									
2. Red Oak	71									
3. Sour Wood	9.	10								
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Sour Wood		0	III	3
2. Tulip Poplar	III	3	III	3
3. Sour Gum	II	2	I	1
4. Sour wood	IIII	4		
5. Red Maple	II	2		
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
--++++---+	--++----++

Canopy Cover

Transect #1	Transect #2
-+-++++++++	++-++++++++

Vegetation Data Sheet

Plot Location: Kynite 2 Surveyor's Name: Pam | Greg

Date: 9/8/99

Circle Center Location: Row 2, #17

Tree Identification

Species	Diameter in (cm)
1. White Oak	46
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Tulip Poplar	++++	5		0
2. Sourwood	1	1	1	1
3. Red Maple			++++ 111	8
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
++ + − + + + + + −	+ + + + − − + − − −

Canopy Cover

Transect #1	Transect #2
− − − − − − + − − −	− − − − − − − − ++

Vegetation Data Sheet

Plot Location: Kynite Z Surveyor's Name: Sally / Patrick

Date: 9/8/99

Circle Center Location: Row 5, #9

Tree Identification

Species	Diameter in (cm)									
1. Chestnut Oak	80	100								
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	1	1	III	3
2. Tulip Poplar	1	1		0
3. Red Oak			1	1
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
++ - - - - - - - - -	++-+--+++-

Canopy Cover

Transect #1	Transect #2
++++++++++-	+-+++++++++

Vegetation Data Sheet

Plot Location: Kynite 2 Surveyor's Name: Sally I Patnck

Date: 9/8/99

Circle Center Location: Row 5, #13

Tree Identification

Species	Diameter in (cm)									
1. White Oak	52	51								
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	𝍸 𝍸	10	11	2
2. Dogwood	11	2	1	1
3. Pignut Hickory	1	1	1	1
4. Highbush Blueberry			1	1
5. Chestnut Oak			1	1
6. Sour Gum			1	1
7. Ash			1	1
8. Tulip Poplar			𝍸 𝍸	10
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ - ++ - - - + - -	++ + - + + + + - -

Canopy Cover

Transect #1	Transect #2
+ + + + + + + + + +	- - + + + + + + + +

Vegetation Data Sheet

Plot Location: Kynite Z Surveyor's Name: Patrick/Sally

Date: 9/8/99

Circle Center Location: Row 3, # 7

Tree Identification

Species	Diameter in (cm)
1. American Beech	7
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Tulip Poplar	II	2		0
2. Sourwood	II	2		0
3. Winged Sumac	I	1		0
4. Chinkapin	I	1		0
5. Red Maple			III	3
6. Sour Gum			III	3
7. Pignut Hickory			II	2
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
-++++-++-+	++++--+-++

Canopy Cover

Transect #1	Transect #2
++--++-+++	---++++++-

Vegetation Data Sheet

Plot Location: Loth 1 Surveyor's Name: Sally / Patrick

Date: 9/23/99

Circle Center Location: Row 6, #5

Tree Identification

Species	Diameter in (cm)									
1. Red Maple	8	8								
2. White Oak	52									
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	𝍸 𝍸 𝍸 𝍸 I	21	𝍸 𝍸 I	11
2. Mockernut Hickory	I	1		1
3. Chestnut Oak	I	1		1
4. Sour Gum	𝍸	5	I	6
5. Red Oak			I	1
6. American Beech			I	1
7. White Oak			I	1
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
- - - - - + + + + +	+ + + - - - - + - +

Canopy Cover

Transect #1	Transect #2
+ + + - - - - - - +	- - - - - - - - - - -

Vegetation Data Sheet

Plot Location: Loth1 Surveyor's Name: Sally / Patrick

Date: 9/23/99

Circle Center Location: Row 5, # 16

Tree Identification

Species	Diameter in (cm)									
1. Red Maple	9	7								
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	𝍸 𝍸 𝍸 𝍸	20	𝍸 𝍸 𝍸 𝍸 11	22
2. Sour Gum	11	2	1111	4
3. White Oak	1	1	11	2
4. Mockernut Hickory	11	2		0
5. American Beech	1	1	1	1
6. Sourwood	1	1		0
7. Dogwood			1	1
8. Black Oak			1	1
9. Red Oak			11	2
10. Chestnut Oak			11	2

Ground Cover

Transect #1	Transect #2
- - - + + - - - - -	+ + + + - + + + + +

Canopy Cover

Transect #1	Transect #2
- - - - + + + + + +	- - - - - - - - - -

Vegetation Data Sheet

Plot Location: Loth 1 Surveyor's Name: Sally / Patrick

Date: 9/23/99

Circle Center Location: Row 4, # 3

Tree Identification

Species	Diameter in (cm)
1. Tulip Poplar	10
2. White Oak	61
3. Red Maple	26
4. Chestnut Oak	45
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	𝍸 𝍸 𝍸	15		0
2. Smooth Sumac	I	1		0
3. Tulip Poplar	II	2		0
4. Sour Gum	III	3	II	2
5. Chestnut Oak			𝍸 𝍸 𝍸 III	18
6. Mockernut Hickory			I	1
7. Dogwood			II	2
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
++-+----+-	++-+--+---

Canopy Cover

Transect #1	Transect #2
-----+++--	+----++++--

Vegetation Data Sheet

Plot Location: Loth I Surveyor's Name: Sally / Patrick

Date: 9/23/99

Circle Center Location: Row 4 #7

Tree Identification

Species	Diameter in (cm)									
1. Tulip Poplar	8	14								
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Tulip Poplar	IIII	4	I	1
2. Red Oak	I	1	I	1
3. Red Maple	I	1	++++ ++++ II	12
4. Mockernut Hickory	I	1		0
5. Sour Gum			I	1
6. Ironwood			II	2
7. American Beech			I	1
8. Pignut Hickory			I	1
9. White Oak			II	2
10.				

Ground Cover

Transect #1	Transect #2
---++--+++	+-+-++++++

Canopy Cover

Transect #1	Transect #2
+++--~+----	++++---++--

Vegetation Data Sheet

Plot Location: 16th | Surveyor's Name: Sally | Patrick

Date: 9/23/99

Circle Center Location: Row 2, # 7

Tree Identification

Species	Diameter in (cm)									
1. Red Maple	8	33								
2. Chestnut Oak	39									
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	𝍸 111	8	𝍸 𝍸 𝍸 1111	19
2. Chestnut Oak	111	3	𝍸 1111	9
3. Sour Gum	11	2		0
4. Black Oak			1	1
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
- - - + - - - - - +	- - ++ - - - ++ -

Canopy Cover

Transect #1	Transect #2
++ - - - - - - - - -	- - - - - ++ - - +

Vegetation Data Sheet

Plot Location: Loth I Surveyor's Name: Sally / Patrick

Date: 9/23/99

Circle Center Location: Row 1, #12

Tree Identification

Species	Diameter in (cm)
1. White Oak	45
2. Black Oak	8
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	𝍸 111	8	𝍸 11	7
2. Red Oak	𝍸	5	1	1
3. Chestnut Oak	𝍸 11	7	𝍸 1111	9
4. Sour Gum	𝍸 𝍸	10	𝍸 1111	9
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
++++++-+-	++-+-++-++

Canopy Cover

Transect #1	Transect #2
----+------	----------

Vegetation Data Sheet

Plot Location: 10th1 Surveyor's Name: Sally / Patrick

Date: 9/23/99

Circle Center Location: Row 8 #8

Tree Identification

Species	Diameter in (cm)										
1. White Oak	39										
2. Chestnut Oak	12	52									
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Chestnut Oak	𝍸 𝍸 ||||	14	𝍸 𝍸 ||| 𝍸 𝍸 |||	28
2. White Oak	||	2		0
3. Red Maple	𝍸 𝍸 |||	15	|||	3
4. Red Oak	||	2		0
5. Virginia Pine	|	1	||	2
6. Sour Gum	|||	3	|	1
7. Pignut Hickory	|	1		
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
++++ −−+−− +	+−−−++++++

Canopy Cover

Transect #1	Transect #2
----------	+++−+−−−−−

Vegetation Data Sheet

Plot Location: Loth 1 Surveyor's Name: Sally Patrick

Date: 9/23/99

Circle Center Location: Row 7, #13

Tree Identification

Species	Diameter in (cm.)									
1. Red Maple	7									
2. Red Oak	10									
3. White Oak	60	54								
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	𝍸 𝍸 𝍸	15	𝍸 𝍸 𝍸 I	16
2. Black Oak	III	3		0
3. Sourwood	I	1	𝍸	5
4. Tulip Poplar	I	1		0
5. Sour Gum	𝍸 I	6	III	3
6. Sour Wood	III	3		0
7. Red Oak			II	2
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ - + - - + + - - +	- - + - - - - + - -

Canopy Cover

Transect #1	Transect #2
+ + + + + + + + + - -	+ + + + + - - - - -

Vegetation Data Sheet

Plot Location: Loth 1 Surveyor's Name: Sally / Patrick

Date: 9/23/99

Circle Center Location: Row 1, #8

Tree Identification

Species	Diameter in (cm)
1. Sour Gum	14
2. Chestnut Oak	51
3. White Oak	41
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	++++ |	6	++++ |||	8
2. Sour Gum	+++	5	||||	4
3. Black Gum	|	1		0
4. Chestnut Oak			||	2
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ - - + - - - - - +	+ + + + + - + + - -

Canopy Cover

Transect #1	Transect #2
+ + + + - - - - + -	- - - - - + + - - +

Vegetation Data Sheet

Plot Location: Loth 1 Surveyor's Name: Sally / Patrick

Date: 9/23/99

Circle Center Location: Row 3, #3

Tree Identification

Species	Diameter in (cm)
1. White Oak	13
2. Chestnut Oak	43
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Dogwood	IIII	4		0
2. Red Maple	++++	5	+++	5
3. Sour Gum	II	2	II	2
4. Chestnut Oak	III	3		0
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
++++ + - - + - -	+ - - - - - + + + - -

Canopy Cover

Transect #1	Transect #2
- - - - - - - - - - -	- - - - - - - - - - -

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: Patrick Sally Ann

Date

Circle Center Location: Row 1, #3

Tree Identification

Species	Diameter in (cm)									
1. Chestnut Oak	47	9	52							
2. Red Maple (8 trunks)	52									
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Tulip Poplar	1	1	II	2
2. Red Maple	IIII	4	~~IIII~~ III	8
3. American Beech	1	1	1	1
4. Sour Gum	1	1		0
5. White Oak	III	3	IIII	4
6. Chestnut Oak	1	1	IIII	4
7. Loblolly Pine	1	1		0
8. Iron Wood		0	1	1
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ - +++ - - + - +	++ - - + - + ++ -

Canopy Cover

Transect #1	Transect #2
- - - - - ++ - ++	- - - - - - - - - -

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: Patrick / Sally / Pam

Date

Circle Center Location: Row 1, # 10

Tree Identification

Species	Diameter in (cm)
1. Chestnut Oak	54
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Virginia Pine	II	2		0
2. Sour Gum	I	1		0
3. Chestnut Oak	⧸⧸⧸ III	9	III	3
4. American Beech	I	1		0
5. White Oak	I	1	II	2
6. Red Maple	IIII	4	III	3
7. Mountain Laurel		0	II	2
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
--++ --+++	----+ --++-

Canopy Cover

Transect #1	Transect #2
----------	+-------+

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: PATRICK / Sally / Pam

Date

Circle Center Location: Row 2, # 4

Tree Identification

Species	Diameter in (cm)
1. Red Maple	15
2. White Oak	19
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	𝍸 ||	7	|	1
2. Sour Gum	𝍸	5		0
3. Virginia Pine	|	1		0
4. Tulip Poplar		0	𝍸 𝍸	10
5. Loblolly Pine		0	|	1
6. White Oak		0	|||	4
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+++ -- + + + ++	-- + - + + ++++

Canopy Cover

Transect #1	Transect #2
- - - - - + - - - -	+ ++ - - - - - - -

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: Patrick/Sally/Pam

Date

Circle Center Location: Row 2 # 13

Tree Identification

Species	Diameter in (cm)									
1. Chestnut Oak	55	42								
2. Sour Gum	11									
3. Red Maple	11	17								
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Chestnut Oak	𝍸 𝍸 ||	12	|||	3
2. Red Maple	|||	4	1	1
3. Mountain Laurel	1	1		0
4. Sour Gum	1	1		0
5. Tulip Poplar		6	11	2
6. White Oak		0	𝍸	5
7.				
8.				
9.				
10.				

Ground Cover		Canopy Cover	
Transect #1	Transect #2	Transect #1	Transect #2
+ + - - - + + + + +	+ + + + + + + + -	- - - - - - - + - - -	- - - - - - - - - - -

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: PATRICK Sally Pam

Date

Circle Center Location: Row 3 #6

Tree Identification

Species	Diameter in (cm)
1. White Oak	72
2. Red Maple	9
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Sour Gum	1	1	1	1
2. Chestnut Oak	𝍸 𝍸 𝍸 |	21	𝍸 |||	9
3. Red Maple	𝍸	5	𝍸 𝍸 𝍸 ||	23
4. American Beech	1	1		0
5. White Oak	||	2	1	1
6. Tulip Poplar	||	2	𝍸 |||	9
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
++--+-+--	++---+++++

Canopy Cover

Transect #1	Transect #2
+----+++++	++---+++-

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: Patricia / Sally / Ann

Date

Circle Center Location: Row 3, # 17

Tree Identification

Species	Diameter in (cm)										
1. White Oak	37	58									
2. Pignut Hickory	17										
3. Red Maple	26	8	15								
4. Chestnut Oak	18										
5.											
6.											
7.											
8.											
9.											
10.											
11.											

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	~~||||~~ ||||	9	~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ |	21
2. Chestnut Oak	|||	3	|||	3
3. Red Oak		0	1	1
4. Sour Gum		0	||	2
5.				
6.				
7.				
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ ++++ - - - -	++ -- -- - - - +

Canopy Cover

Transect #1	Transect #2
+ +++++++++	-- +++++++ -

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: Patrick / Sally / Pam

Date						

Circle Center Location: Row 4 # 12

Tree Identification

Species	Diameter in (cm)									
1. Chestnut Oak	14	55	10							
2. White Oak	10									
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	𝍸 ||	7	1	1
2. Chestnut Oak	𝍸 𝍸 𝍸 |||	18		0
3. Sour Gum	𝍸	5		0
4. White Oak		0	||	2
5. American Beech	1	1		0
6. Sweet Cherry	1	1		0
7. American Holly	1	1		0
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+ +++ − − − + ++	− + ++ − − + ++ ++

Canopy Cover

Transect #1	Transect #2
− − − − + ++ ++ − −	++ − − − − + − − +

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: Patrick/Sally/Ann

Date						

Circle Center Location: Row 4, #16

Tree Identification

Species	Diameter in (cm)									
1. Red Maple	9									
2. Chestnut Oak	18	48								
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Red Maple	~~IIII IIII IIII IIII IIII IIII IIII~~ II	37	~~IIII IIII IIII IIII~~ III	23
2. Chestnut Oak	II	2	~~IIII~~ II	7
3. Sour Gum	II	2	I	1
4. Pignut Hickory	I	1		0
5. Red Oak	I	1		0
6. Mountain Laurel		0		1
7.				
8.				
9.				
10.				

Ground Cover		Canopy Cover	
Transect #1	Transect #2	Transect #1	Transect #2
+ + + + + + + + + + +	+ + + + + + + + + + +	- - - - - - - - + + +	- - - - - - - - - - -

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: Patrick / Sally / Pam

Date

Circle Center Location: Row 5, #3

Tree Identification

Species	Diameter in (cm)
1. Red maple	46
2. White Oak	64
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. American Beech	I	1		0
2. Chestnut Oak	II	2		0
3. Sour gum	IIII	4		0
4. Red Maple	++++ III	7	++++ I	6
5. Pignut Hickory	II	2		0
6. Red oak	I	1	I	1
7. Flowering Dogwood	I	1	I	1
8. Tulip Poplar		0	III	3
9. White Oak		0	II	2
10.				

Ground Cover

Transect #1	Transect #2
++++ - + - - ++	++++ - + - - - - +

Canopy Cover

Transect #1	Transect #2
++++ - - - + - - -	++++ + - + - ++

Vegetation Data Sheet

Plot Location: Loth 2 Surveyor's Name: Patrick / Sally / Pam

Date

Circle Center Location: Row 5, #8

Tree Identification

Species	Diameter in (cm)										
1. Chestnut Oak	14	38									
2. White Oak	7	8	8								
3. Red Maple	11										
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											

Shrub Identification-Woody Stems less than 7 cm

Species	Transect #1	Total	Transect #2	Total
1. Chestnut Oak	𝍸 III	8	II	2
2. Red Maple	III	3	III	3
3. Black Oak	I	1	III	3
4. Sour Gum	III	3	I	1
5. White oak	𝍸	5		0
6. Red Oak	I	1		0
7. American Beach		0	I	1
8.				
9.				
10.				

Ground Cover

Transect #1	Transect #2
+++--++--+	+++++--++-

Canopy Cover

Transect #1	Transect #2
------++++	---+++++

Appendix V

This appendix contains list of the dates the plots were censured and the Beaufort Wind Scale. All dates fall within the breeding season of the breeding birds found on the plots. The Beaufort Wind Scale is was used as a method for recording weather conditions.

List of Dates Breeding Bird Censuses were Conducted on each Plot

Loth One	Loth Two	Kyanite One	Kyanite Two
22 May 1999	23 May 1999	25 May 1999	25 May 1999
26 May 1999	26 May 1999	27 May 1999	27 May 1999
29 May 1999	29 May 1999	28 May 1999	28 May 1999
8 June 1999	8 June 1999	31 May 1999	31 May 1999
14 June 1999	14 June 1999	7 June 1999	7 June 1999
23 June 1999	23 June 1999	15 June 1999	15 June 1999
25 June 1999	25 June 1999	24 June 1999	24 June 1999
28 June 1999	28 June 1999	6 July 1999	6 July 1999
2 July 1999	2 July 1999	7 July 1999	7 July 1999

Beaufort Wind Force Scale

Wind Force (meters/second)	Effects on Land	Wind Speed
0	Still; smoke rises vertically	0-0.2
1	Smoke drifts rise, weather vane still	0.3-1.5
2	Leaves rustle; wind felt on face; weather vane begins to move	1.6-3.3
3	Leaves and twigs move; light flags extended	3.4-5.4
4	Thin branches move; dust and paper raise form ground	5.5-7.9
5	Entire small trees in leaf sway	8.0-10.7

The scale may be extended beyond this point for higher wind speeds. The Beaufort number is also sometimes referred to as a force number, e.g. a "force 3" wind speed.

Reproduced from McDonald 1997

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