

Vegetation Sampling Notes, Summer 1993

by Chris Martin

Vegetation sampling was conducted in four fields from 7/8/93 to 9/3/93. This sampling was conducted in order to assist with the managerial decisionmaking process as it pertains to the preservation of historic fields. In addition to the cultural significance of these fields it has been documented that several species of threatened songbirds inhabit these fields.

The historic fields have over the years been subjected to a variety of management regimes (including prescribed burning, mowing, grazing and leasing). These activities have occurred to various degrees of varying intensity at various times. Some fields such as #7 (Stop 4) have not required active maintenance in over 13 years. Others such as field 8 (Stop 2) have received some form of treatment every year.

It is hoped this study will begin to lay the ground work for understanding what is out in the fields, what the natural environments needs are (ie the songbirds) and how best to integrate a management regime that meets cultural needs (ie maintains historic fields) yet mitigates damage to the parks natural resources.

This report details how I went about the data collection process, the methodology I employed, an explanation of the data sheet and some observations. Included are the actual maps used in the field, a field list and a copy of an actual data sheet.

Methods:

Maps: Accurate maps are vital to the successful collection of field data. This section details how I derived my maps and includes some comments about them based upon my field experiences.

Maps of 14 fields within the park have been completed. These maps were drawn from the set of aerial photographs taken of the park in 1991. These aerial photos are in the possession of the park. (Scale 1:12000, black & white)

Mylar was placed over the aerial photos and the borders of the fields were traced onto the mylar. Also marked onto the mylar overlay were points such as cannon platforms, monuments, interpretive displays, roads, structures etc. that would serve to provide points of reference when working in the field. The completed tracing was then photocopied onto paper. Care was taken to record the percent of enlargement and to enlarge the map's scale so that the ratios would remain accurate. Onto the paper maps were drawn the transects.

There were two criteria to be considered when deciding where to place the transects in any given field.

- 1). The transects needed to be easily determined once one is out in the field.
- 2). The transects need to provide ample coverage of the fields.

Often times these two goals were not entirely compatible. For example, in the "fingers" of field 8c it would have been much easier to have located and walked transects that ran the length of the fingers. However, I felt that given the distance between transects there would not have been much room for more than a few transects running the length of the field. My concern was that a sample of a few long transects down the center or edge of this field would not (due to the edge effect and successional patterns) provide a fair and accurate representation of such a field. Therefore, I laid the transects running across the field, which sacrifices convenience for coverage.

Another component of transect determination is the identifiability of a baseline transect from which all the others could be located. The strategy I employed is as follows.

I began by inspecting each field and focused my attention on where the fields were the most easily accessible and also what the predominant landmarks in the vicinity were. The two criteria for an initial starting point are permanence and accessibility. Labeled on the map of each field is the initial starting point from which one can begin the process of locating all the rest of the transects and sample points.

For example, I chose at field #8 to construct my transects around the fire photo point (a brass cap set in concrete) located on top of the ridge to the south of the Nielson house. This point is permanent and easily located. Standing on the photo point I shot compass bearings of dominant features such as the Nielson house and monuments. These features were identifiable in the aerial photos and were easily plotted on the mylar overlay and transferred to the paper maps. I also took compass bearings from one prominent feature to another. Knowing for example, the bearing between the Nielson house and the northern most gun platform I was able with the aid of a protractor to determine North on the map. Once I had North defined, I again used the protractor and plotted the "backsights" to the compass bearings I had shot in the field from the photo point towards the landmarks. Then, via triangulation I was able to pinpoint on the map the location of the fire photo point.

Referring again to field 8, I knew I wanted to run my transects across the fingers therefore, my baseline needed to run perpendicular to them or parallel with the field edges. Therefore, I drew a line through my initial starting point that

would run at an angle such that the perpendiculars to that line would provide me with the coverage I desired. Again with the aid of a protractor, I was able to determine the degree headings of the transects and the perpendicular baseline.

I arbitrarily chose 50m as the distance between my transects. Analysis of collected experimental data (conducted by Dr. Brian Underwood) indicated that approximately thirty sample plots per field would be of a sufficient sample size. Therefore, with the aid of a scale I determined the maximum distance between sample plots along the given transects that would 1) allow coverage over the entire field and 2) keep the sample size close to thirty. All the fields with the exception of #14 were of sufficient size so as to allow a sample size of at least thirty plots given a distance of 50m between transects.

Transects were incorporated into the data collection methodology for several reasons:

- * Transects help to insure that data collection is performed in a systematic manner.
- * Transects work to provide a thorough and comprehensive coverage of the study area.
- * Data collection along a transect helps to reduce the effects of sample site selection bias.
- * The use of transects helps to insure that points could be relocated for confirmation, follow-up visits and future replication of data collection efforts.

Transects were located in the field through the aid of a compass, the map previously described and by pacing off the predetermined distances. Sample plots were located by pacing off the predetermined distances along the transects (listed on the maps for each field) with the exception of the initial sample plot. The number representing the distance from the beginning of a new transect to the location of the first sample plot was derived through the generation of a random number from a random number table.

At the start of each new transect, a random number of equal or less magnitude than the distance between sample plots for that particular field was generated. This introduces a degree of randomness to the placement of sample plots along a transect and it also allows the placement of the first sample plot to be closer to the edge than the predetermined distance would otherwise allow.

Map Notes:

Experience working with the maps for the four fields sampled during the summer of '93 indicates they are fairly accurate. The

estimates of the number of points sampled given the distance between transects and points as indicated upon each map are close but require monitoring. This is probably due in large part to the necessity to generate a random number for the initial placement of a sample plot when commencing a new transect. The randomness was difficult to figure into the estimates. For example, when I conducted the data collection in field 8B I came up short of the required 30 points per field. Therefore, I split transects 6 & 7 and 8 & 9 to add two new transects, 22 & 23. This allowed me to increase the number of sample sites in a systematic yet random fashion.

For each field, depicted on it's map is a readily identifiable and locatable starting point. From this point stems the fields baseline. Also depicted for each field are the bearings which define the transects and their perpendiculars. Shooting the bearings and pacing the distances will locate the transects and sample plots.

Also depicted on the maps are three cover types of vegetation: A, B & C. "A" represents areas of herbaceous cover with little or no woody stems visible. Areas of "B" cover type are areas where the woody species are visible above the herbaceous cover but do not at this time represent any significant management difficulties as regards mitigation. Areas of "C" cover represent areas where woody stems are not only very prevalent but will require intensive management applications in order to rectify their presence. This delineation as depicted upon the maps is based upon a visual inspection of the fields in June of '93 and is reproduced from field sketches. The information depicted by the cover type mapping is of a general nature intended to serve as a rough indication of field conditions at that time.

Note that Field 01 (Stop 1) was not sampled as originally intended. This field was at first to be considered merely as a component of the much larger field as mapped. It was subsequently decided to sample only the approximately 4 acre site immediately below the scenic stop 1 overlook. Included with the maps is a sketch of field 01 as sampled and the layout of the transects.

Quadrant placement: From a starting point (either the beginning of a transect or a previously completed sample point) I would take a compass bearing matching the bearing of the transect I was working on. I would then pace the required number of meters along my bearing. I would attempt to not watch the ground below me but try to remain focused on the horizon. The intention here was to reduce site selection bias. When I paced the proper distance I would stop and immediately place the quadrant on the ground so that the corner of the quadrant touched my right front toe. Therefore, if a transect ran for example north/south, the boxed sides of the quadrant would also run north/south along the same line as the transect, with the perpendiculars running east/west. The quadrant was placed so that the 1/5m section was

always "running" north/south on the outer edge of the plot (see diagram 1).

The 1/5m section of the study plot could be delineated through the use of a piece of string which could be set into place between two notches cut into the side of the quadrant at the appropriate points. This allows for greater accuracy in determining which woody stem individuals are "in" and which are "out" when taking measurements.

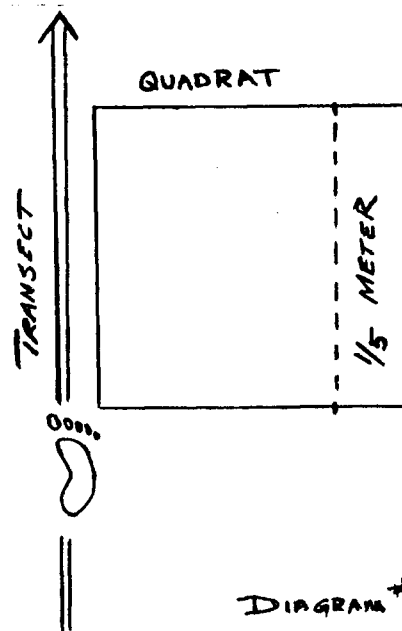


DIAGRAM #1

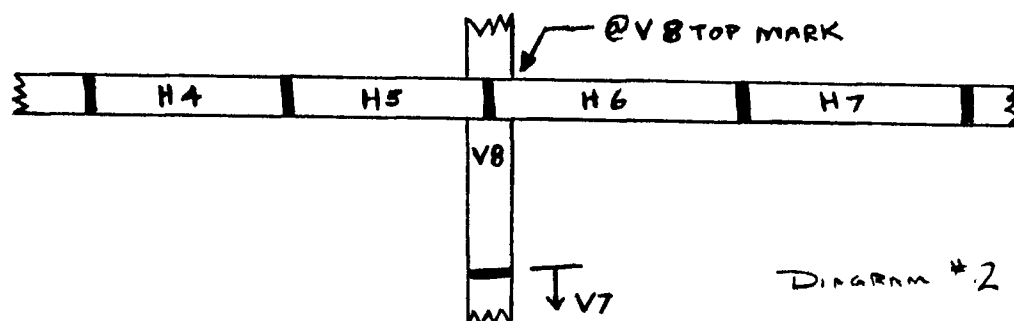
Litter depth: This measurement was made through the use of a meter stick and a piece of PVC pipe (1-1/4" Diam. x 4" Long). The meter stick was randomly placed within the plot down to the soil surface. The PVC pipe was then fitted over the meter stick and allowed to slide gently down towards the ground until sufficient resistance to constitute a litter layer and not obstructing vegetation was met. By carefully squeezing the pipe against the meter stick, one can raise the meter stick and read from the bottom of the PVC pipe the depth of the litter.

Density: This measurement was made with the use of two pieces of threaded rod approximately 7mm in diameter. The rods were marked off into ten sections of ten centimeters each (Whitmore 1981).

The first measurement was taken by dropping one rod at a vertical angle to the ground down to the soil surface. Then the rod was examined within each of its 10 centimeter increments for "hits." A "hit" is defined as any piece of any live vegetation touching any portion of the rod within a specified 10 centimeter section. The readings from this initial placement of the first rod were recorded in the "0" column of the density matrix. V1 - V10 equate to the ten vertical sections on the rod.

Next, while holding the vertical rod in place, the second rod was held at a perpendicular angle starting at V10 (the highest

increment above the ground). At each vertical increment, recordings of hits were taken that occurred within each 10 centimeter section of the horizontal rod. (See diagram 2). These recordings completed the rest of the matrix. [Example: box V1H2 represents a section that is 10 centimeters off the ground and 4 sections (40 centimeters) to the left of the vertical rod.]



Cover: The estimates of cover were based upon the Braun-Blanquet cover scale (Causton 1988).

<u>Rating</u>	<u>Description</u>
0	sparsely, or very sparsely present; cover very small
1	plentiful, but of small cover value
2	very numerous, or cover 5-20%
3	any number of individuals; cover 25-50%
4	any number of individuals; cover 50-75%
5	cover greater than 75%

For each herbaceous genus, a number based upon this scale was assigned. Note that each genus was estimated based upon its own percent of cover within the quadrant. Therefore, the sum total of percent cover for a densely populated plot could well exceed 100%.

Woody: Within the 1/5m section of the sample plot, each woody stemmed individual was identified to the genus level and measured. Height was measured with a meter stick to the nearest millimeter. Height was measured from the soil surface to the highest point on the plant. Diameter was measured using a pair of calipers and was measured to the nearest millimeter. Diameters were measured at the base of the woody stem.

Explanation of Data Sheet Entries:

Field: Each field was numbered according to a number and name scheme listed on the Saratoga National Historical Park Field List of 1990 (see attached). Field numbers in this instance correlate to the following commonly used descriptors.

<u>Field #</u>	<u>Common Name</u>
01	Stop 1 (Below Overlook)
07	Stop 4 Field
8A-D	Stop 2 Fields
A	Northeast Section
B	Hillside below house
C	Stump field
D	West of house
11	Fern Field

For further clarification see map of field 8.

Data base entry fldtrnpt equates to field number as described, transect number and sample point number on that particular transect. Transects are depicted on the field maps and the number of meters between sample points in each field is denoted as well.

Slope/Aspect: At each point the slope (in degrees) and aspect (in degrees) of the terrain was measured. Slope was measured through the use of an Abney level and Aspect was measured with the aid of a compass.

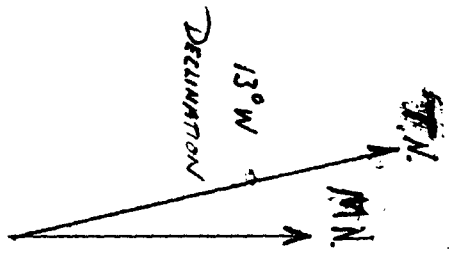
Wet/Dry: This was a subjective measure. I conducted a visual inspection of the sample point and attempted to determine if the site had the potential to hold water or drain well.

Litter depth: This was a measurement (in centimeters) that was determined with the use of a meter stick and a piece of PVC pipe.

Density: In each box within the matrix was recorded the number of vegetative "hits" upon a pair of density rods.

Cover: This recording is comprised of two components: first, within the meter square plot each herbaceous plant genus was identified. Next, a value on the scale of 0-5 was assigned to each genus listed. The rating is an estimate of the percent cover for each genus within the plot.

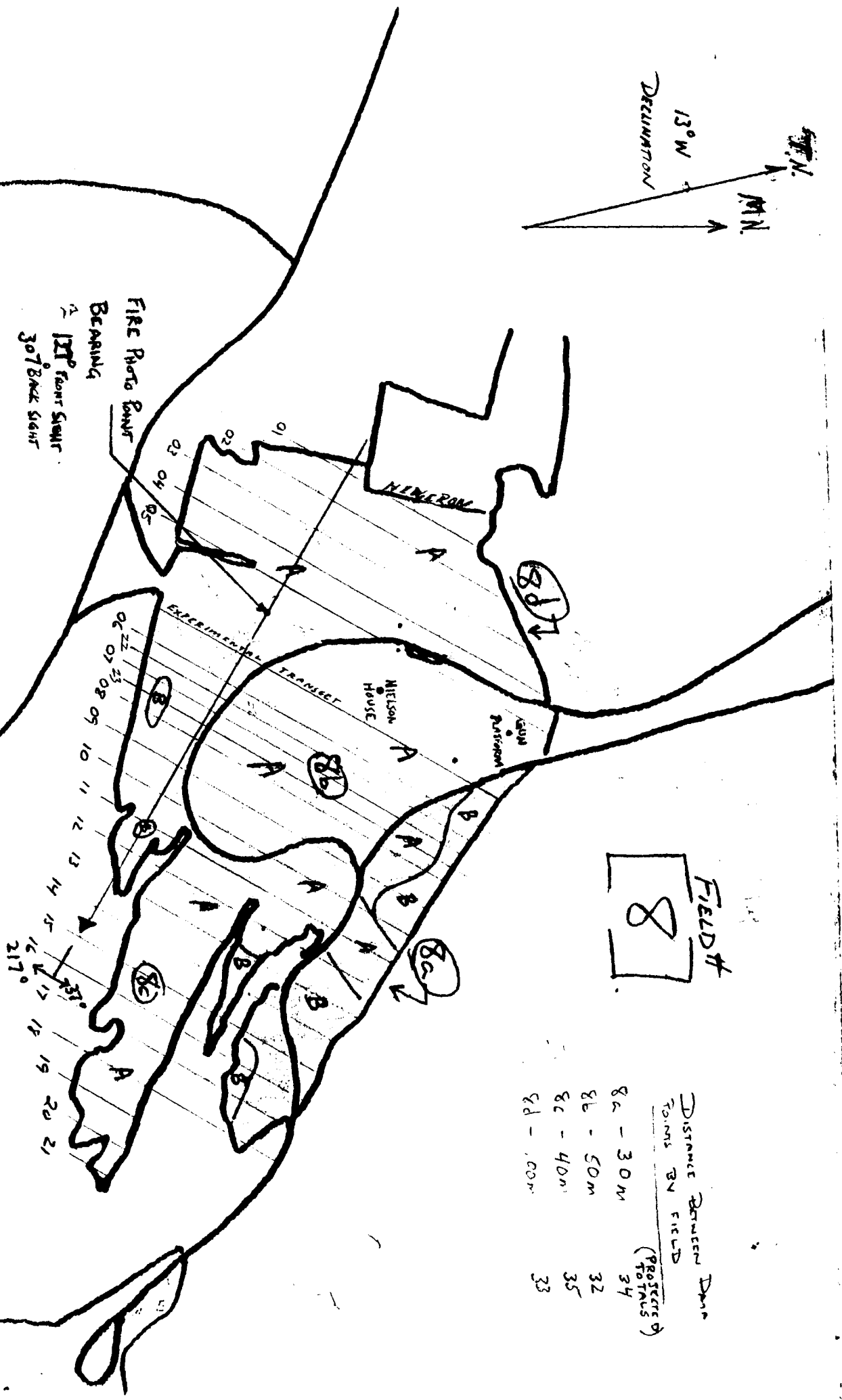
Woody: Again, within a 1/5m section of the plot each woody stemmed individual was identified to the genus level. For each individual stem, the height and diameter measurements were taken and recorded. Height was measured with a meter stick, diameter with a pair of calipers. The 1/5m entry is a yes/no entry. It was determined that 1/5m of a plot was sufficient for woody plant data collection, therefore, in each plot from the nonexperimental transects, a "yes" was entered for this category.



FIELD #
 8

DISTANCE BETWEEN DATA
 POINTS BY FIELD
 (PROCESSED
 TOTALS)

8a - 30m	34
8b - 50m	32
8c - 40m	35
8d - 100m	33



NOTE: EXPERIMENTAL TRANSFER LIES
 70m SW OF FIRE PHOTO POINT.
 DISTANCE BETWEEN ALL OTHER
 TRANSFERS IS 50m.
 DISTANCE BETWEEN DATA POINTS
 ON EXPERIMENTAL TRANSFER IS 20m. (FIRST POINT WAS 11m IN
 FROM SOUTHERN EDGE)

150% ENLARGEMENT
 OF 845.0000
 DISTANCE BETWEEN GUN PULPIT & NIELSON HOUSE
 BEARS 186m.
 DISTANCE SCALE: 1:12000
 POWER
 POLE

References

Causton, David R. 1988. An Introduction to Vegetation Analysis. Unwin Hyman, London. pg 8.

Whitmore, Robert C. 1981. Structural Characteristics of Grasshopper Sparrow Habitat. J. Wildl. Manage. 45(3):811-814