

S-1 INSTRUCTIONS

Introduction

The S-1s are two 600m-long strips across the study area which are the southernmost one-meter wide strips of the S-10s. They cover a total of 1200m² (Figure 3-1). The S-1s are divided into 600 1x1m plots and are marked at every fifth meter with a red or orange flag. The flags are labeled with their distance from the west end of the S-1 line.

Seedlings and Coverage

Two analyses, a seedling count (similar to that used on the 4m² regeneration plots) and a mini-relevé, are conducted on each 1m² plot. These analyses provide information on the regeneration of the forest and on the herbaceous vegetation. In selected years, all S-1 plots are measured. Each year every fifth plot (1, 6, 11, etc.) is measured. S-1 analyses are conducted by two-person crews, one of whom must be very familiar with the forest's vascular flora. This person is called the botanist and the other is called the forester. Monitoring of S-1s begins on the west side and proceeds east across the study area. Plots are numbered from 1 to 600 with an "N" (north) or "S" (south) prefix.

Procedure

1. Lay a 50m tape along the flags that mark the southern boundary of the S-10. When every fifth plot is being sampled, a tape is not necessary.
2. Place the 1m² quadrat frame over the plot. The orange flag numbers reflect the distance along the S-1 line; the plot number corresponds to the distance at the southeast corner of the plot. When every plot is being done, lay the frame along the tape and mark the two east corners with wire stakes. When every fifth plot is being done, the southwest corner goes over the orange flag and one other corner (usually the northeast corner, opposite the orange flag) is marked with a permanent white plastic stick or an orange-painted popsicle stick. This facilitates locating the quadrat in the same place each year.

Place the frame as close as possible to the ground. Return vegetation bent by the frame to its natural position. On uneven ground, hold the frame level and drop surveying pins to mark the corners of the plot.

3. Record date, observer, recorder, weather, and plot number on both data sheets. For plot number, be sure to indicate north or south.
4. *Seedlings.* (See Figure 3–25.) With one person north of and the other south of the plot, lay a height stick to divide the 1m² quadrat approximately in half. Count tree seedlings by species and size class. The botanist records the data as described under Data Sheet Components. Count only those seedlings that are rooted within the plot. Seedlings should be distinguished from root or stump suckers.
5. *Ground components.* (See Figure 3–25.) The botanist estimates percentage ground coverage by the following components: dry or wet litter, log, tree root or bole, moss, lichens, soil, bare rock, or water. See Table 3–2 for descriptions and number codes of the components.
6. *Species coverage.* (See Figure 3–26.)
 - a. The botanist identifies all species of plants within the plot, while the forester records abbreviated names. These should be recorded on page 2 of the S-1 coverage data sheet. The forester should say the names back to the botanist for confirmation and to set the recording pace. Start with the tallest plants (maximum of 5m) and work down. If a plant overhangs the plot but it is rooted outside the plot, it is still counted. After the obvious species are recorded, the botanist searches the plot thoroughly while the forester records the species numbers.
 - b. The botanist then records the relative abundance for each species in each of the three height strata on the following scale:
 - R = 1 individual,
 - 1 = >1 individual and/or <5% coverage,
 - 10 = 5–15% coverage,
 - 20 = 15–25% coverage, etc., by 10% classes to
 - 100 = >95%.
7. *Total vegetation coverage.* (See Figure 3–25.) The botanist estimates the total herbaceous coverage by height strata and records the estimate on page 1. The categories are as follows:
 - 0 = no plants in strata,
 - 1 = <5% coverage,
 - 10 = 5–15% coverage,
 - 20 = 15–25% coverage, etc., by 10% classes to
 - 100 = >95%.

See "Relevé Instructions" for estimating percentage coverage.

8. Whoever finishes first should move the quadrat frame to the next location.

Data sheet components

There are two data sheets for every plot. The first data sheet is for seedling counts, ground components, and total vegetation coverage; the second sheet is for species lists and relative abundances.

Page 1: Seedlings, ground components, and total vegetation coverage (Figure 3-25)

Plot #: (Plot number) Be sure to record N or S. The number on each flag is the number for the plot to the west of the flag. So a flag numbered 10 means that the plot to the west is N or S 10 and the plot to the east is N or S 11.

SEEDLINGS

Spec: (Tree species) Record by species number (see Table 3-1).

When all seedlings have been counted, the tallies can be summarized by recording the number of seedlings, a decimal point, and the size class (e.g., 12 seedlings in the number two size class would be recorded 12.2). The size classes are defined as follows:

1=<0.1m tall (first white line on the height stick)

2=0.1 to 0.499m tall (second white line on height stick)

3=0.5 to 2m tall (2x height stick)

4=>2m tall and <1.5cm DBH

When suckers are present, use a slash to diagonally divide the appropriate column and record the number of suckers in the lower portion.

GROUND

%: (Percentage coverage) Estimate coverage for the ground components listed in the *Comp.* column. They should add up to 100%.

Comp: (Ground component) List ground components as outlined in Procedure 5.

VEGETATION COVERAGE

% Cov: (Percentage coverage) These were the readings from the canopy prism and spherical densiometer; we now use a ceptometer which records data electronically.

<0.25, 0.25-1, 1-5: (Height strata) Record total vegetation coverage for the plot within each height strata.

It is preferable to record page one data on the polycorder. Seedling data and coverage data are recorded on different polycorders. Formats are as follows: S-1 coverage variables are PLOTNUM, COV<.25, COV.25-1, COV1-5, GCOMP1, %COV1, GCOMP2, %COV2, GCOMP3, %COV3, GCOMP4, and %COV4. S-1 seedling variables are PLOTNUM, SPECIES, SEEDLNG1, SEEDLNG2, SEEDLNG3, and SEEDLNG4.

Page 2: Species coverage (Figure 3-26)

Plot #: (Plot number) Record as described previously. Use both columns for species within one plot.

Species: (Plant species name) Abbreviate in an easily recognized form.

Num: (Plant species number) See separate species list for numbers.

<0.25, .25-1, or 1-5: (Height strata) Record abundance as described in Procedure 7 for each species within a height strata.

Equipment

Quadrat frame	50m tape
Wire stakes	Height stick
1.5cm-diameter caliper	Plant species list with numbers
Data sheets	Pencils
Clipboard	Polycorders (2)

Light Measurements

Light measurements are made using a ceptometer. Refer to "Light Measurements with a Ceptometer" instructions for operation of the ceptometer.

Ceptometer readings should be taken at each S-1 plot that was sampled as close to the time of the sampling as possible. To take ceptometer readings, stand on the north side of the plot. Hold the ceptometer perpendicular to the S-1 line with the tip of the ceptometer near the S-1 line with the light sensors equi-distant from the north and south edges. Take readings at a height of 0.25m and at distances of 0.25, 0.5, and 0.75m across the plot; the three readings are averaged to give one reading per plot.

In order to keep track of the readings, take a list of the S-1 stations into the field and record next to each the memory number for the reading from that station.

Equipment

Sunfleck ceptometer
Pencil

List of S-1 stations
Clipboard

Photography of S-1 Plots

To produce a permanent visual record, selected S-1 plots are photographed before the forest manipulation, and again as needed in the future. Initially we will photograph every tenth plot on the managed area (1, 11, 21, etc.) and every twentieth plot on the control area (301, 321, 341, etc.)

Procedure

1. Photographs should be taken in late July–early August, as close to the time of S1 measurements as possible. By taking them near noon, long shadows will be avoided.
2. Use a 35mm camera with a 55mm focal length lens. High-speed ektachrome (ASA 400) allows you to use a high F-stop, thereby assuring reasonable depth of field. A slow shutter speed (1/8 to 1/30 seconds) will be necessary.
3. Photographs should be taken at an oblique angle, about 1m south of the plot and 1.5m above it. A tripod is necessary to keep the height standard and because of the low shutter speeds required. The small tripod with the legs fully extended and the center post half extended will give the desired height.
4. Place the plot frame around the plot and adjust the camera so that the sides of the frame coincide with the edges of the view-finder reasonably well.
5. Focus on vegetation near the ground, near the center of the plot. If the illumination at this spot is not representative pan around the plot to get an average value. If vegetation *outside* the plot is obscuring the view it should be pulled out of the way.
6. On the bottom of a small clipboard, tape a 3x5 card with the date and transect location (north or south) written in bold letters. On the top, use the clip to hold 2 or 3 cards to give the plot number. The clipboard should be positioned near the back of the plot or in a bare spot so that it can be read on the photo, but will not obscure the vegetation. Often it will be necessary to use the camera's timed shutter release to take the photo while holding the clipboard above the plot.

Equipment

35mm camera with 55mm lens	Kodak high-speed ektachrome
Tripod	film (400 ASA)
Quadrat frame	Clipboard and number cards

Evaluation

The relevé portion of this study shares the subquadrat relevés' problems, but they are minimized by using a smaller sample size (1m^2), repeating the same 240 plots every year, and using the same observer from year to year.

A difficulty shared by both the relevé and seedling portion of the S-1 study is that the distribution of sample plots every 5m along the S-1 transects results in inadequate and uneven distribution of samples within forest cover and soil types. There are also possible problems of spatial autocorrelation in data analysis. The small sample area also results in tremendous variability and numerous zeros in the data set, which sometimes confounds the analyses.

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Figure 3-25. Seedlings and total coverage data sheet, page 1.

HOLT RESEARCH FOREST
S-1 DATA SHEET

Date 29 JUL 86 Observer DWL Recorder JWW Weather _____

Plot#	Spec.	SEEDLINGS				GROUND		VEGETATION COVERAGE			
		1	2	3	4	%	Comp.	%Cov	<0.25	0.25-1	1-5
287	7	4.1				80	dl		10	10	10
	1	2.1				10	bole				
						10	moss				
288	5		1.2			100	dl		10	10	20
	25		5.3	3.3							
	1	2.1	2.2								
	7	2.1									
289	None					10	moss		10	1	1
						10	dl				
290	7	3.1				100	dl		1	1	10
	25		1.2	1.3							
	1										
291	7	2.1				100	dl		10	1	10
	2		1.2								
	1	1.1									
292	7	2.1				90	dl		1	0	1
	1	1.1				10	moss				
293	5	1.1				10	moss		1	0	1
						90	dl				
294	7	2.1				100	dl		1	1	1
295	7	1.1				100	dl		1	1	0
296	None					100	dl		0	0	1

