TREE REGENERATION INVENTORY INSTRUCTIONS

Introduction

Five permanent circular regeneration plots, one $200m^2$ (radius = 7.98m) and four $4m^2$ (radius = 1.13m), are located in each quadrat. They are inventoried periodically to evaluate the status of regeneration from seedling to sapling size over a large portion of the study area. The $4m^2$ plots measure seedlings and saplings <1.5cm DBH, and the $200m^2$ plot measures saplings between 1.5 and 9.49cm DBH.

Set-up

To lay out the plots, first locate the center pin of the quadrat. This point will be the center of the $200m^2$ plot and the $4m^2$ plots are spaced around it (Figure 3–5).

The boundaries of the $200m^2$ plot are not permanently marked. Trees are determined to be in or out of the plot by measuring to the base of the tree.

The $4m^2$ plot centers are permanently marked with a small red or orange flag. They are located 4m from the quadrat center in each of the cardinal directions (N, S, E, and W). If the old flag cannot be found, the plot center must be relocated. The flags may be missing; a metal detector can help locate the wire and the flag should be replaced.

$4m^2$ Plot Procedure

The $4m^2$ plots should be measured first to avoid trampling. Proceed in the order, north, east, south, west. The boundary of a plot is determined by rotating a height stick (1.13m is the highest orange mark) around the plot center.

1. Record date, observers, recorder, weather, and quadrat number (see Figure 3–6). Plot number (quadrat and direction, e.g., 3E1N) is recorded in the left margin under P#.
2. *Tree regeneration.* Count and record all young trees by species and height class. See Tables 3–1 and 3–2 for species and height class codes. Designated on the height stick with orange lines, the height classes are
    1. <0.1m tall;
    2. 0.1–0.49m tall;
    3. 0.5–2m tall;
    4. >2m tall and <1.5cm DBH.

    The plot should be divided between the observers, with each systematically searching half. It is best to start together at a known point and rotate the height stick around the center flag slowly scanning the ground as the stick passes over it.

Tiny seedlings are very difficult to spot, so look carefully. As seedlings are found, their species and size class are called out to the recorder, who repeats the information back to corroborate it. They are recorded by species and class with a dot and dash tally. The number is then tallied as (number of trees, decimal point, height class). For example, 12 trees in the first size class would be recorded "12.1" (See Figure 3–6.)

3. *Ground layer coverage.* This is an estimate of what portion of the ground different components cover. Ground layer cover codes are listed here and in Table 3–2.
   0 = dry litter
   1 = wet litter (litter that has been in standing water for extended periods, usually dark and compact)
   2 = log (>10cm diameter)
   3 = tree bole
   4 = tree root
   5 = moss
   6 = lichens
   7 = soil
   8 = bare rock
   9 = water
   10 = slash

   Make estimates to the nearest 10% for all components constituting >5% (i.e., 10%, 20%, 30%, etc.). Note that if a component = 6% it would be recorded as 10%. All three crew members should make independent estimates and then reach a consensus.
4. *Low stratum coverage.* This refers to vegetation <0.5m tall. It is estimated (see "Relevé Instructions") and recorded to the nearest 10%. First estimate the total coverage; if coverage is less than 5%, put a dash "–" in the % column next to "Total." All individual species covering >5% of the plot are then listed (use abbreviated scientific names) in the species column and their coverage estimated to the nearest 10%. If no single species has >5% coverage, list the most common species with a "–" in the % column. If no single species predominates, write "mixed" in the species column.
5. *Mid-stratum coverage.* This refers to the vegetation between 0.5 and 2m tall. Data for coverage by species are recorded per the instructions for the low stratum. All vegetation in this cylindrical volume is taken into account even if it belongs to a plant rooted outside the plot or to a tree higher than 2m.

6. *Ceptometer readings.* These are taken by the recorder while the others set up the next plot. A reading is taken in each of the four cardinal directions at a height of 1m. These four readings are averaged to a single reading for each station. See "Light Measurements with a Ceptometer" for more detail on the use of the ceptometer.

200m² Plot Procedure

The 200m² plot is inventoried after the 4m² plots are completed. All trees within a 7.98m radius of the plot center, and between 1.5 and 9.49cm DBH, are measured with a tree fork and recorded by species, condition, and DBH class. The DBH class for DBH x = [(x-1)+.5] to [x+.49].

1. Record date, observers, recorder, weather, and quadrat number (see Figure 3–7).
2. To have a consistent starting place, the observers start by the north 4m² flag and move clockwise, calling out the species, DBH class, and condition (live or dead) of each tree 1.5–9.49cm DBH. After a tree is counted, it is marked with chalk on the side toward the plot center. Dead trees are scarred twice on the side toward plot center. If a tree is near the plot boundary, a 7.98m tape or an electronic distance measuring device is used to determine if it is in or out. To be in, more than half of the base of the tree should be in the plot.
3. The recorder calls back the information to corroborate it. Species are recorded with number codes (see Table 3–1). Note condition as dead (1) or live (0); keep separate rows for each species and condition on the data sheets. The number of trees in each size class is recorded with a dot and dash tally. The number is then tallied as: # of trees, decimal point, size class, e.g., "3.2" means three trees in the second size class.
4. When the five plots (four 4m² and one 200m²) in a quadrat are finished, the data sheets are checked for completeness and stapled together.

Equipment

Tree marking chalk	Chalk holders
Tree forks (2)	Clipboard
Data sheets (200m², 4m²)	Instructions
Pencils	Fixed radius plot tape (7.98m)
Hatchets (2)	Height sticks (2)
Compass	Stapler
Ruler	Ceptometer

Evaluation

The regeneration plots, both 200m^2 and 4m^2, provide insight into the dynamics of the forest. The location of one sample site per quadrat provides a good indicator for the forest as a whole, but its limits become apparent when utilizing more detailed forest cover and soil type information. For many of the dominant types there are inadequate sample sizes to do an analysis on the differences among types. In general the variability between plots is quite high, resulting in large standard deviations and weakening any statistical analysis.

In 1992, a remeasurement of a limited set of the original 160 sites was undertaken; only sites in five major forest/drainage class types were sampled because the other types had an inadequate sample size from the 1984 inventory. In addition, sample sites were added in the larger harvest gaps.

Date: 4 NOV 87 File name: REGEN.INS

Figure 3–5. Layout of regeneration plots within a quadrat.

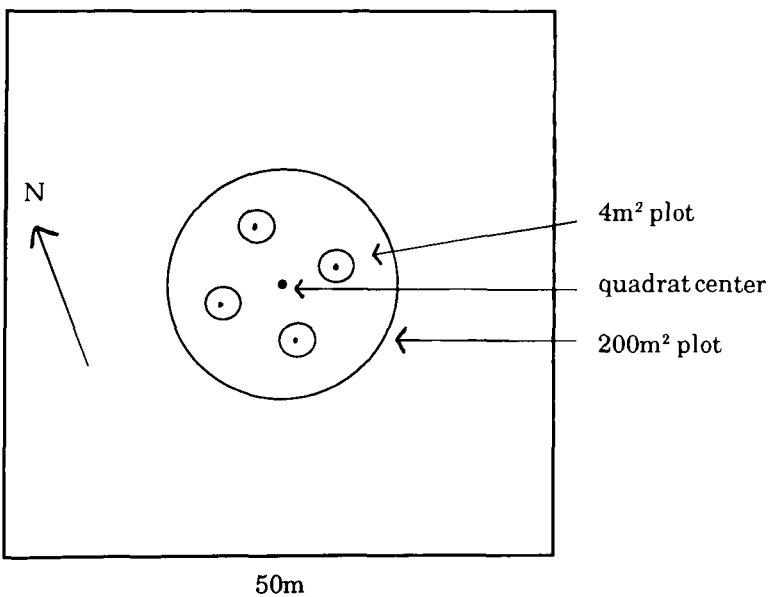

Table 3–2. Ground layer components and height class codes for $4m^2$ regeneration plots.

Ground Layer Components Codes	
Ground Layer Components	Number Code
Dry Litter	0
Wet Litter	1
Log	2
Tree Bole	3
Tree Root	4
Moss	5
Lichens	6
Soil	7
Bare Rock	8
Water	9
Slash	10

Height Classes for $4m^2$ Regeneration Plot

1	<0.1m tall
2	0.1–0.499m tall
3	0.5–2m tall
4	>2m tall and <1.5cm DBH

Low Stratum—<0.5m tall
Mid-Stratum—0.5–2m tall

Figure 3–6. 4m² regeneration plots data sheet.

HOLT FOREST 4m² REGENERATION PLOTS

Date 15 JUN 84 Observers JJS DCK Recorder SMC

Quadrat 4D1 Weather clear, cool

P#	Class Spec	A	B	C	D	Ground Layer %	Components	low stratum <1m %	Species	mid stratum 1–5m %	Species	Density >5m
N	12	3.1	5.2			100	dry litter	40	Total	10	Total	#1
	16		1.2	4.3				20	Aster macro.	10	B. cherry	97
												#2
												100
E	3		2.2	4.3				30	Total	–	Total	#1
	1	2.1						20	B. fir	–	B. fir	94
	7		3.2									
												#2
												86
S	12	7.1			1.4			–	Total	–	Total	#1
	16		1.2					–	wh. ash	–	wh. ash	95
												#2
												99
W	1			3.3		100	dry litter	–	Total	0	Total	#1
								–	Maian.	0		93
												#2
												94

Figure 3–7. 200m² regeneration plots data sheet.

HOLT FOREST 200m² REGENERATION PLOTS

Date 28JUN83 Observers CAM JRF Recorder HRA

Quadrats 7P4 Weather clear, warm

DBH Class

Spec	Cond	2	3	4	5	6	7	8	9
8	0	1.2	1.3	1.4					
5	0	11.2							
1	0		3.3		1.5			1.8	
13	0		1.3						
6	1			2.4	3.5				
7	0	8.2				1.6	2.7		
6	0		3.3					1.8	
7	1	6.2	4.3						